APPENDIX C

DRAFT ENVIRONMENTAL ANALYSIS

FOR THE

REGULATION FOR GREENHOUSE GAS EMISSION STANDARDS FOR CRUDE OIL AND NATURAL GAS FACILITIES

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Draft Environmental Analysis

Prepared for the proposed

Regulation for Greenhouse Gas Emission Standards

for Crude Oil and Natural Gas Facilities

Air Resources Board
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Date of Release: May 31, 2016

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ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
APE	Area of Potential Effects
ARB or Board	California Air Resources Board
CAA	Federal Clean Air Act
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CO	Carbon monoxide
CO_2	Carbon dioxide
DOGGR	Department of Conservation, Division of Oil, Gas, and Geothermal Resources
EA	Environmental Analysis
EIA	U.S. Energy Information Administration
EIR	Environmental impact reports
GHG	Greenhouse gas
GWP	Global warming potential
HMTA	Hazardous Materials Transportation Act
LDAR	Leak Detection and Repair
NEPA	National Environmental Policy Act
NOx	Nitrogen oxides or oxides of nitrogen
NO_2	Nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standard
MOU	Memoranda of Understanding
MOA	Memoranda of Agreement
PM	Particulate matter
PM10	Respirable particulate matter

PM2.5	Fine particulate matter (particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers)
PRC	Public Resources Code
Proposed Regulation	Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities
RCRA	Resource Conservation and Recovery Act
ROG	Reactive organic gases
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SBCAG	Santa Barbara County Association of Governments
scfh	Standard cubic feet per hour
SO2	Sulfur dioxide
SO_X	Sulfur oxides
SWPPP	stormwater pollution prevention plan
TAC	Toxic air contaminant
TCR	Tribal Cultural Resources
TSCA	Toxic Substance Control Act
U.S. EPA	U.S. Environmental Protection Agency
UIC	Underground Injection Control
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VMT	Vehicle miles traveled
VOC	Volatile organic compound

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1.0 INTRODUCTION AND BACKGROUND

A. Introduction

This Draft Environmental Analysis (Draft EA) is Appendix C of the California Air Resources Board (ARB or Board) staff report that is presented to the Board for consideration of the proposed Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities (Proposed Regulation), i.e., the Proposed Project under the California Environmental Quality Act (CEQA). The Project Description section of this Draft EA presents a summary of the Proposed Regulation, i.e., the Proposed Project under the California Environmental Quality Act (CEQA). A detailed description of the Proposed Regulation is in the "Staff Report: Initial Statement of Reasons for the Proposed Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities,"(Staff Report) date of release June 3, 2016, which is hereby incorporated by reference and also available at http://www.arb.ca.cc.oil-gas/oil-gas.htm. A summary of pertinent text of the regulation is provided in Chapter 2, Project Description, of the Draft EA.

This Draft EA is intended to disclose potential environmental impacts and identify potential mitigation specific to the Proposed Regulation. The Proposed Regulation is designed to reduce greenhouse gas (GHG) emissions, primarily methane, and avoid any substantial increases in pollutants while providing criteria air pollutant and toxic air contaminant co-benefits where possible. In some cases, as described in Chapter 4 in the Draft EA, potentially significant environmental effects may occur as a result of compliance actions taken in response to the Proposed Regulation. Mitigation measures are described in this Draft EA that could be expected to reduce potentially significant impacts to less-than-significant levels, for individual projects, if agencies with discretionary authority adopt the mitigation measures. The Draft EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient or may not be implemented by other parties) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable.

B Background

Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006 (AB 32, Statutes of 2006, Chapter 488), declares that global warming poses a serious threat to the economic well-being, public health, natural resources, and environment of California and charges ARB with "monitoring and regulating sources of emissions of greenhouse gases that cause global warming in order to reduce emissions of greenhouse gases" (Health & Saf. Code, § 38510). AB 32 provided initial direction to create a comprehensive multi-year program to limit California's GHG emissions to 1990 levels by 2020 and initiate the transformations required to achieve the State's long-range climate objectives. One specific requirement of AB 32 is to prepare a "scoping plan" for achieving the maximum technologically feasible and cost-effective GHG emission

reductions by 2020 (Health & Saf. Code, §38561(a)). The Proposed Regulation is identified in the Climate Change Scoping Plan, and subsequent First Update to the Climate Change Scoping Plan, as one of the recommended actions to achieve additional GHG emission reductions from the energy sector.

The purpose of the Proposed Regulation is to reduce GHG emissions, primarily methane, from onshore and offshore crude oil and natural gas production; crude oil, condensate and produced water separation and storage; natural gas gathering and boosting stations; natural gas processing plants; natural gas transmission compressor stations; and natural gas underground storage.

C. Related Regulations

1. Underground Injection Well Regulations

DOGGR supervises the drilling, operation, maintenance and abandonment of oil, gas and geothermal wells within California. DOGGR also has primary permitting authority of Class II wells under the U.S. Environmental Protection Agency's (U.S. EPA) Underground Injection Control (UIC) program[1]. The purpose of the UIC program is to protect underground sources of drinking water from underground injection. Class II injection well permits are distinct from permits that authorize the drilling and operation of oil, gas and geothermal wells. Oil and gas resources in California are primarily managed through PRC, Division 3; California Code or Regulations, Title 14, Division 2, Chapter 4; Memoranda of Understanding (MOU) and Memoranda of Agreement (MOA)[2] between DOGGR and several Federal, State and local agencies; and Field Rules which are specific to a field or Areas, Zones or Pools within a field. In addition, local entities may have zoning or other regulations.

In some circumstances, two permits are required to drill a well on private land in California. The well owner/operator needs to obtain a Conditional Use Permit (or similar discretionary land use permit) from the local agency, such as a city or county, and a drilling permit from DOGGR. In many counties, however, most wells drilled in existing oil or gas fields do not require a local land use permit and only a DOGGR permit is required. Depending on the well's location and proposed operations, additional permits may be required from the Bureau of Land Management (for wells located on public land), the State Lands Commission (for wells located on State-owned land), and/or other agencies such as the State Reclamation Board, the U.S. Department of Agriculture (USDA) Forest Service, Air Pollution Control and Management Districts, Regional Water Quality Control Boards (RWQCBs), California Department of Fish and

[1] MOU between DOGGR and U.S. EPA can be found at: http://www.conservation.ca.gov/dog/for_operators/Documents/MOU-MOA/MOA_EPA_UIC_1982.pdf

[2] The relevant MOU/MOAs can be found at: http://www.conservation.ca.gov/dog/for_operators/Pages/mou_moa.aspx

Wildlife (CDFW), and U.S. Fish and Wildlife Service (USFWS). DOGGR does not issue permits for the production facilities associated with a production well; these permits and approvals are issued by local and regional agencies through building, grading, and discretionary land use permits.

An operator requesting approval for an underground injection project must provide detailed data that, in DOGGR's judgment, is pertinent and necessary for the evaluation of a proposed project (Cal Code Regs., tit. 14, § 1724.6). The application must include a detailed engineering study that includes a statement of the primary purpose of the project; the reservoir and fluid characteristics of each injection zone; and the planned well drilling and plugging and abandonment program to complete the project, including a flood-pattern map showing all injection, production, and plugged and abandoned wells, and unit boundaries. The engineering study must also include casing diagrams for all idle, plugged and abandoned, and deeper-zone producing wells within the area affected by the project. The casing diagrams in the engineering study must provide evidence that plugged and abandoned wells in the area will not have an adverse effect on the project or cause damage to life, health, property, or natural resources (Cal Code Regs., tit. 14, § 1724.7(a)).

Along with the engineering study, a geologic study and injection plan must also be submitted. At a minimum, the geologic study must include a structural and isopach map, a cross section, and a representative electric log that identifies all geologic units, formations, freshwater aquifers, and oil or gas zones (Cal Code Regs., tit. 14, § 1724.7(b)). The injection plan must include a map showing all injection facilities; maximum anticipated injection pressure and volumes; monitoring system or method used to ensure that injection fluid is confined to the intended zone or zones of injection; method of injection; corrosion protective measures; the source, analysis, and treatment of the injection fluid; and the location and depth of water-source wells to be used in conjunction with the project (Cal Code Regs., tit. 14, § 1724.7(c)).

Additional information can be requested for projects that may be hazardous, large, unusual, or particularly complex (Cal Code Regs., tit. 14, § 1724.7(e)). In instances where an operator desires to change or modify any of the originally approved operating methods or conditions of a project, such as an increase in size, a change of the injection interval, or an increase of the injection pressure, the operator must first obtain approval from DOGGR (Cal Code Regs., tit. 14, § 1724.10(a)).

In order to expedite the application process, operators should evaluate the data being submitted to determine if the program requirements discussed below would be met. It is the operator's responsibility to demonstrate to DOGGR's satisfaction that the program requirements would be met. The commercial Class II requirements permits requirements include:

- Restrictions on injected fluids to a list approved by U.S. EPA for injection into the commercial well and contained in the permit;

- Approval of new sources and exceptional circumstances;
- Construction of a fence surrounding the commercial well which can be locked so as to preclude unauthorized access to the well;
- Submission of the brine manifest records (or equivalent information) associated with hauling brine to the well; and
- Submission of quarterly analyses of samples taken from the location identified in the permit for the normal brine constituents: sodium, calcium, total iron, magnesium, barium, sulfate, chloride, bicarbonate, carbonate, sulfide, total dissolved solids, pH, resistivity, and specific gravity.

Operators may add new sources for commercial disposal under an effective commercial Class II permit by submitting a request for modification and an analysis of the new source. These permit requirements ensure that injection of hazardous materials would occur at a depth that would prevent surface contamination of soil and water, and minimize risks to the environment. Operators must notify and receive approval from DOGGR if the current conditions of a permit are anticipated to change, such as: increase in size, change of injection interval, or increase in injection pressure.

2. Well Stimulation Treatment Regulations

Effective July 1, 2015, DOGGR adopted new regulations for well stimulation treatments pursuant to Senate Bill (SB) 4. These regulations establish requirements to ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments; and require disclosure of the composition and disposition of well stimulation fluids, including hydraulic fracturing fluids, acid well stimulation fluids, and flowback fluids. The regulations further establish requirements regarding well stimulation permits, public disclosure, neighbor notification, and water well testing.

The Proposed Regulation would not address the permitting of crude oil and natural gas wells, which are under the exclusive authority of DOGGR. The Proposed Regulation would not require an additional permit for well stimulation treatments, nor would it authorize well stimulation treatments or other methods of oil and gas extraction. DOGGR's well stimulation treatment regulations, pursuant to SB 4, are not discussed further in this Draft EA.

3. Federal Regulation Associated with Oil and Gas Operations

Oil and gas operations are also subject to the federal Clean Air Act (CAA), including its permitting requirements. They are subject to U.S. EPA performance standards for oil and gas operations. These regulations, 40 Code of Federal Regulations Part 60, Subparts OOOO and OOOOa, limit emissions of methane and volatile organic compounds (VOCs) from new equipment installed at crude oil and natural gas operations. Corresponding air toxics standards for certain pieces of oil and gas

equipment are also codified in 40 Code of Federal Regulations Part 63. In August 2015, U.S. EPA also proposed standards under section 111 of the CAA for methane emissions that would cover new equipment in oil and gas fields, finalizing these standards in May 2016. At the same time, U.S. EPA proposed advisory "control techniques guidelines" to control volatile organic compound emissions from affected existing sources in areas not in attainment with ambient air quality standards[3]. In March 2016, U.S.EPA announced a new regulatory effort to reduce methane from existing sources and has begun a formal information gathering process to assist in the development of comprehensive regulations. The Bureau of Land Management (BLM) has also recently proposed new regulations to reduce the waste of natural gas from venting, flaring, and leaks during oil and gas operations on federal and tribal lands. These proposed regulations are consistent with EPA's NSPS rules and would apply to sources not covered in those rules. ARB's proposed regulation does not apply to tribal lands; it does apply to federal lands, in these cases ARB may develop an MOU with BLM to coordinate enforcement.

4. Emergency Regulations Addressing the Aliso Canyon Underground Storage Field

Emergency regulations were issued by DOGGR as required by Governor Edmund G. Brown Jr.'s January 6, 2016 declaration of a state of emergency due to the discovery of a leak associated with a natural gas well within the Aliso Canyon Underground Storage Field in Los Angeles County (i.e., the Southern California Gas Company natural gas leak at Aliso Canyon). The emergency regulations require gas storage facility operators throughout the State to comply with six new measures:

- Require at least a daily inspection of gas storage well heads, using gas leak detection technology such as infrared imaging;
- Require ongoing verification of the mechanical integrity of all gas storage wells;
- Require ongoing measurement of annular gas pressure or annular gas flow within wells;
- Require regular testing of all safety valves used in wells;
- Establish minimum and maximum pressure limits for each gas storage facility in the state; and
- Require each storage facility to establish a comprehensive risk management plan that evaluates and prepares for risks at each facility, including corrosion potential of pipes and equipment.

[3] The U.S. EPA has begun the process to regulate methane emissions from the oil and natural gas industry. Information is available at: https://www3.epa.gov/airquality/oilandgas/methane.html

ARB, as well as other agencies are involved with response to this natural gas leak, including: the California Office of Emergency Services, DOGGR, the South Coast Air Quality Management District, the County of Los Angeles Fire and Public Health Departments, the City of Los Angeles, the California Public Utilities Commission, the California Energy Commission, the Division of Occupational Safety and Health, the California Office of Environmental Health Hazard Assessment, and U.S. EPA. On February 11, 2016, the leaking gas well was temporarily controlled. A permanent seal of the well was announced by DOGGR on February 18, 2016.

D. Prior Environmental Analysis

The Proposed Regulation would be new to California; therefore, there are no prior compliance responses and ARB has not conducted a prior EA specific to this regulation. However, the Proposed Regulation was identified and analyzed in the 2008 Scoping Plan, and in the EA for the First Update to the Climate Change Scoping Plan[4] as one of the reasonably foreseeable compliance responses in the energy sector to achieve GHG emission reductions.

E. Environmental Review Process

1. Requirements under the California Air Resources Board Certified Regulatory Program

ARB is the lead agency for the Proposed Regulation and has prepared this Draft EA pursuant to its CEQA certified regulatory program. Public Resources Code (PRC) Section 21080.5 allows public agencies with regulatory programs to prepare a "functionally equivalent" or substitute document in lieu of an environmental impact report or negative declaration, once the program has been certified by the Secretary for Resources Agency as meeting the requirements of CEQA. ARB's regulatory program was certified by the Secretary of the Resources Agency in 1978 (Cal. Code Regs., tit.14, § 15251(d)). As required by ARB's certified regulatory program, and the policy and substantive requirements of CEQA, ARB prepared this Draft EA to assess the potential for significant adverse and beneficial environmental impacts associated with the proposed actions and to provide a succinct analysis of those impacts (Cal. Code Regs., tit.17, § 60005(a) and (b)). The resource areas from the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15000 et. seq) Environmental Checklist (Appendix G of that document) were used as a framework for assessing potentially significant impacts.

ARB has determined that approval of the Proposed Regulation is a "project" as defined by CEQA. CEQA defines a project as "the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably

[4] Final Environmental Analysis for the First Update to the Climate Change Scoping Plan, March 2014 http://www.arb.ca.gov/cc/scopingplan/2013_update/appendix_f_final_ea.pdf

foreseeable indirect physical change in the environment, and that is … an activity directly undertaken by any public agency (Cal. Code Regs., tit. 14, §15378(a)).” Although the policy aspects of the Proposed Regulation do not directly change the physical environment, indirect physical changes to the environment could result from reasonably foreseeable compliance responses taken in response to implementation actions identified in the Proposed Regulation.

Furthermore, the requirements of PRC section 21159 apply when ARB adopts a rule or regulation requiring the installation of pollution control equipment, or a performance standard or treatment requirement. Thus, as required by CEQA, this Draft EA contains “an environmental analysis of the reasonably foreseeable methods by which compliance with that rule or regulation will be achieved (Cal. Code Regs., tit. 14, § 15378).” The analysis shall include reasonably foreseeable environmental impacts of the methods of compliance, reasonably foreseeable feasible mitigation measures related to significant impacts, and reasonably foreseeable alternative means of compliance that would avoid or eliminate significant impacts.

2. Scope of Analysis and Assumptions

The degree of specificity required in a CEQA document corresponds to the degree of specificity inherent in the underlying activity it evaluates. An environmental analysis for broad programs cannot be as detailed as for specific projects (Cal. Code Regs., tit. 14, § 15146). For example, the assessment of a construction project would be naturally more detailed than one concerning the adoption of a local general plan because construction-related effects can be predicted with a greater degree of accuracy (Cal. Code Regs., tit. 14 § 15146(a)). Because this analysis addresses a broad regulatory program, a general level of detail is appropriate. However, this Draft EA makes a rigorous effort to evaluate significant adverse impacts and beneficial impacts of the reasonably foreseeable compliance responses that could result from implementation of the Proposed Regulation and contains as much information about those impacts as is currently available, without being unduly speculative.

The scope of analysis in this Draft EA is intended to help focus public review and comments on the Proposed Regulation, and ultimately to inform the Board of the environmental benefits and adverse impacts of the proposal. This analysis specifically focuses on potentially significant adverse and beneficial impacts on the physical environment resulting from reasonably foreseeable compliance responses taken in response to implementation of the proposed actions within the Proposed Regulation.

The analysis of potentially significant adverse environmental impacts of the Proposed Regulation is based on the following assumptions:

1. This analysis addresses the potentially significant adverse environmental impacts resulting from implementing the Proposed Regulation compared to existing conditions.

2. The analysis of environmental impacts and determinations of significance are based on reasonably foreseeable compliance responses taken in response to implementation of the Proposed Regulation.

3. The analysis in this Draft EA addresses environmental impacts both within California and outside the State to the extent they are reasonably foreseeable and do not require speculation.

4. The level of detail of impact analysis is necessarily and appropriately general because the Proposed Regulation is programmatic. While the general location of oil and gas facilities covered under the Proposed Regulation are known within California, decisions by the regulated entities regarding compliance options and the precise location of the many components covered in the Proposed Regulation are unknown. Furthermore, attempting to predict decisions by entities regarding the specific location and design of infrastructure undertaken in response to implementation of the Proposed Regulation would be speculative (if not impossible) at this stage, given the influence of other business and market considerations in those decisions. As a result, there is some inherent uncertainty in the degree of mitigation that would ultimately need to be implemented to reduce any potentially significant impacts identified in this Draft EA. Consequently, this Draft EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be implemented by the agency with authority to do so, or may not be sufficient) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable, where appropriate. It is also possible that the amount of mitigation necessary to reduce environmental impacts to below a significant level may be less than disclosed in this Draft EA on a case-by-case basis. Specific actions undertaken to implement the Proposed Regulation would undergo project-level environmental review as required and compliance processes at the time they are proposed. It is expected that many individual development projects would be able to feasibly avoid or mitigate potentially significant impacts to a less-than-significant level.

5. This Draft EA generally does not analyze site-specific impacts when the location of future facilities or other infrastructure changes are speculative. However, the Draft EA does examine regional (e.g., air district and/or air basin) and local issues to the degree feasible where appropriate. As a result, the impact conclusions in the resource-oriented sections of Chapter 4, Impact Analysis and Mitigation Measures, cover broad types of impacts, considering the potential effects of the full range of reasonably foreseeable actions undertaken in response to the Proposed Regulation.

F. Organization of the Draft EA

The Draft EA is organized into the following chapters to assist the reader in obtaining information about the Proposed Regulation and its specific environmental issues.

- **Chapter 1, Introduction and Background,** provides a project overview and background information, and other introductory material.
- **Chapter 2, Project Description,** summarizes the Proposed Regulation, the potential reasonably foreseeable compliance responses, and implementation assumptions.
- **Chapter 3, Environmental and Regulatory Setting,** contains the environmental setting and regulatory framework relevant to the environmental analysis of the Proposed Regulation.
- **Chapter 4, Impact Analysis and Mitigation,** identifies the potential environmental impacts associated with the Proposed Regulation and mitigation measures for each resource impact area.
- **Chapter 5, Cumulative and Growth-Inducing Impacts,** analyzes the potential for cumulative effects of implementing the Proposed Regulation against a backdrop of past, present, and reasonably foreseeable future projects.
- **Chapter 6, Mandatory Findings of Significance,** discusses the potential for adverse impacts on human beings, cumulatively considerable environmental impacts, and whether the Proposed Regulation would have the potential to degrade the quality of the environment.
- **Chapter 7, Alternatives Analysis,** discusses a reasonable range of potentially feasible alternatives that could reduce or eliminate adverse environmental impacts associated with the Proposed Regulation.
- **Chapter 8, References,** identifies sources of information used in this Draft EA.

G. Public Review Process for the Draft EA

At a public workshop held on December 9, 2014, ARB staff discussed proposed regulatory activities for oil and gas natural gas production, processing, and storage

operations, including well stimulations. Staff also described plans to prepare a Draft EA for the proposed Regulation and invited public feedback on the scope of analysis.

In accordance with ARB's certified regulatory program, and consistent with ARB's commitment to public review and input on regulatory actions, this Draft EA is subject to a public review process through the posting of the Staff Report for the Proposed Regulation. The Staff Report, which includes this Draft EA, is posted for a public review period that begins on June 3, 2016 and ends on July 18, 2016. This period complies with regulatory requirements for a minimum of 45 days of public review.

At the conclusion of the public review period, the Board will hold public hearings on the Proposed Regulation. At the first hearing, currently scheduled for July 21, 2016, the Board will not take any approval action on the proposal; however, the Board may provide direction to staff on modifications to make to the Proposed Regulation. Staff would address any proposed changes in a notice that would be issued with modified regulatory language and supporting documentation for one or more 15-day review and comment periods. At the conclusion of all review periods, staff will compile public comments and responses, including comments on the Draft EA, and prepare the Final Regulation Order, which includes the Final EA and response to environmental comments, for the Proposed Regulation for the Board's consideration at a second public hearing, currently planned for December 2016. If the finalized regulation is adopted by the Board at that time, a Notice of Decision will be posted on ARB's regulatory webpage, filed with the Secretary of the Natural Resources Agency, and transmitted to the State Clearinghouse. Also, the Final Statement of Reasons for the Regulation will be prepared by staff and the completed regulatory package will be filed with the Office of Administrative Law.

2.0 PROJECT DESCRIPTION

A. Introduction

The Proposed Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities (Proposed Regulation) would reduce greenhouse gas (GHG) emissions, primarily methane, from crude oil and natural gas facilities. The Proposed Regulation would apply to any person that owns or operates specified equipment (both future and existing) located within California, including California waters, at facilities in the following sectors:

- Onshore and offshore crude oil or natural gas production;
- Crude oil, condensate and produced water separation and storage;
- Natural gas gathering and boosting stations;
- Natural gas processing plants;
- Natural gas transmission compressor stations; and
- Natural gas underground storage.

As explained in the Introduction above, the Proposed Regulation would not cause an increase in oil and gas extraction within California. The subsections below provide some background information on oil and gas production in California that does not form the basis for the impacts analysis; the impact analysis is based on the description of the Proposed Regulation and compliance responses included in subsection D below. Chapter II of the Staff Report provides a detailed description of the equipment and control strategies covered under the Proposed Regulation.

1. California's Oil and Gas Resources

According to the U.S. Energy Information Administration (EIA), California ranked third in the nation in crude oil production in 2014 (15th in natural gas production) despite an overall decline in production rates since the mid-1980s (excluding Federal offshore areas) (EIA 2015a and EIA 2014b). California has nine main petroleum systems[5], named for the rock where the resource has been generated (source rock) which produce crude oil and natural gas, as follows: 1) Monterey – oil (Los Angeles, Ventura, Santa Maria, and San Joaquin Basins, and Point Arena, Mendocino County); 2) Eel River – gas (Humboldt Basin); 3) Kreyenhagen – oil (San Joaquin Basin); 4) Miocene – oil (Los Angeles, Santa Barbara, Ventura, and Santa Maria Basins Offshore); 5) Moreno

[5] A petroleum system includes all those geologic elements and processes that are essential for an oil and gas deposit to exist in nature. These basic elements include a petroleum source rock, migration path, reservoir rock, seal, and trap; and the geologic processes that create each of these basic elements. (USGS 1988. http://pubs.usgs.gov/bul/1870/report.pdf)

– oil (San Joaquin Basin); 6) Forbes – gas (Sacramento Basin); 7) Starkey – gas (Sacramento Basin); 8) Hornbrook – gas (Sacramento Valley); and 9) Domengine – gas (Sacramento and San Joaquin Valleys) (U.S. Geological Survey [USGS] 1988). The most prolific oil-producing area in California is the San Joaquin Basin in the southern half of the Central Valley; natural gas reserves and production are located primarily in geologic basins in the Central Valley, the coastal basins onshore in Northern California and offshore along the Southern California Coast (EIA 2014a).

The Monterey Formation is the primary source of traditional oil and gas resources in California. Production potential is dependent upon continued improvements in scientific and engineering understanding of the Monterey Formation, both as a source rock and reservoir. According to the Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR), it is likely that potential future oil and gas resource production would be centered in the Los Angeles, Ventura, Santa Maria, Salinas, and San Joaquin Basins; with primary production potential in the San Joaquin, Santa Maria, and Ventura Basins (principally in Santa Barbara and Kern Counties) and limited production potential in San Luis Obispo, Ventura, Kings, Monterey, and Los Angeles Counties (DOGGR 2015). Additionally, the California Council on Science and Technology concluded in Volume 1 of the Independent Scientific Assessment of Well Stimulation in California that the most likely scenario for expanded oil production using well stimulation in California is production in and near reservoirs in the San Joaquin Basin and that future development of new large, basin-wide unconventional natural gas resources (e.g., development of the Marcellus or Barnett shales) is unlikely in California (CCST 2015).

2. Physical Description of Oil and Gas Wells and Production Process

Wells on land (onshore) are drilled on a prepared surface known as a drill or production pad. The drill pad is used for the drilling rig, equipment, and facilities to hold and process drilling muds. After well drilling is complete, the pad is used to hold all of the equipment and facilities used for well completion activities including well stimulation treatments (e.g., water tanks, gel storage unit trucks, chemical storage trucks, transfer pumps, proppant[6], storage trucks or bins, blender units, and pumps) (CCST 2015).

During well drilling, tanks are most commonly used to collect drilling fluids; however, a temporary pit or sump may be constructed to contain drilling fluids under the terms of Statewide General Order No. 2003–0003–DWQ (Statewide General Waste Discharge

[6] A proppant is sized particles mixed with fracturing fluid to hold fractures open after a hydraulic fracturing treatment. In addition to naturally occurring sand grains, man-made or specially engineered proppants, such as resin-coated sand or high-strength ceramic materials like sintered bauxite, may also be used. Proppant materials are carefully sorted for size and sphericity to provide an efficient conduit for production of fluid from the reservoir to the wellbore (Schlumberger Oilfield Glossary, January 2015).

Requirements for Discharges to Land with a Low Threat to Water Quality) from the State Water Resources Control Board.

Once a well has been drilled and cemented, the well completion phase begins. Well completions on a new well include casing, cementing, perforating, gravel packing and installing a production tree. New equipment may be brought on-site for this process. The completion process allows for recovered fluids from newly drilled wells to expel drilling and reservoir fluids and tests the reservoir flow characteristics, which may vent produced hydrocarbons to the atmosphere via an open pit or tank (Code of Federal Regulations § 60.5430). The first stage of well completion is perforation of the casing. Once the casing is perforated, well stimulations, such as acid fracturing, acid matrix, or hydraulic fracturing, may be conducted, which will result in the recovery of well stimulation fluids and reservoir gas at a high volume and velocity necessary to lift excess proppant and fluids to the surface. The recently adopted regulations regarding well stimulation treatments, California Code of Regulations Section 1786(a)(4), prohibit the storage of well stimulation fluids in sumps or pits; all such fluids, including additives and produced water, must be stored in containers. The most common well stimulation treatment used in California is hydraulic fracturing. The Proposed Regulation would require controls on tanks used to circulate, store, or expel liquids or solids from well stimulation treatments.

An oil well is completed with a pumping unit (unless it is free flowing), and connected by piping (flow lines and gathering lines) to production facilities. A gas well is completed with a separator and connected by piping to production equipment. Production facilities typically include tanks, testing facilities, and shipping facilities. Depending on the type of recovery method used, there may also be facilities for chemical treatment and heaters, as well as facilities for generating and distributing steam, and injection wells for injecting steam and/or water. Produced wastewater may be injected into water disposal/enhanced recovery wells and there may be waste handling systems for treatment chemicals and products. Additionally, there may be natural gas handling and flaring facilities. Equipment used for oil and gas production resides within the boundary of oil and gas field operations, but not always directly on the production pad. In California, multiple operators may be producing within the same oil and gas field each with their own facilities (commonly referred to as “leases”) and equipment.

Production operations vary, but most operate 24 hours a day, 365 days per year. From the production facility, most oil and gas is piped through a large network of existing crude oil pipelines to refineries clustered in the Los Angeles Area, the San Francisco Bay Area, and the Central Valley near Bakersfield. Although a pipeline is the primary method of transport, some product may be transported up to approximately 300 miles in 5,000-gallon tanker trucks or by railroad to these locations from less established fields.

B. Objectives of the Proposed Regulation

The primary objectives of the Proposed Regulation are listed below. These objectives are derived from the requirements of AB 32 to reduce GHG emissions, the need for California to attain the National and State ambient air quality standards for criteria air pollutants, and to reduce exposure to toxic air contaminants (TAC).

1. Control vented and fugitive methane emissions from new and existing onshore and offshore crude oil or natural gas production; crude oil, condensate and produced water separation and storage; natural gas gathering and boosting stations; natural gas processing plants; natural gas transmission compressor stations; and, natural gas underground storage.
2. Promote statewide uniformity of methane emission controls for crude oil and natural gas facilities by promulgating a statewide regulation;
3. Achieve reductions of VOC and TACs related to oil and gas production and well stimulation, as a co-benefit through these control strategies;
4. Use control strategies that complement, are consistent with, or are based, in part, on U.S. EPA New Source Performance Standards (NSPS) for the Oil and Natural Gas Industry, specifically 40 Code of Federal Regulations Part 60 Subpart OOOO, and other applicable federal and State regulations;
5. Develop a regulation that is consistent with and meets the goals of The First Update to the Scoping Plan[7] and which can support the draft Short Lived Climate Pollutant Plan[8].
6. Achieve emission reductions that are real, additional, permanent, quantifiable, verifiable and enforceable;
7. Maintain and continue reductions in emissions of GHG beyond 2020, in accordance with AB 32 (*See, e.g.*, Health & Saf. Code, § 38551(b), 38562); pursue measures that implement reduction strategies covering the State's GHG emissions in furtherance of California's mandate to reduce GHG emissions to 1990 levels by 2020;
8. Achieve maximum technologically feasible and cost-effective reductions in furtherance of achieving the statewide GHG emissions limit (Health & Saf. Code, § 38562(a));
9. Ensure that the regulation achieves the additional substantive requirements of AB 32 (Health & Saf. Code § 38562(b) and (d)), including:

   9(a). That activities undertaken pursuant to the Proposed Regulation complement, and do not interfere with, efforts to achieve and maintain

[7] http://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm
[8] http://www.arb.ca.gov/cc/shortlived/shortlived.htm

national and California Air Quality Attainment Standards and to reduce TAC emissions (Health & Saf. Code, § 38562(b)(4));

9(b). Ensure that activities undertaken pursuant to the Proposed Regulation do not disproportionately impact low-income communities (Health & Saf. Code, § 38562(b)(2);

9(c). Minimize, to the extent feasible, the administrative burden of implementing and complying with the Proposed Regulation (Health & Saf. Code, § 38562(b)(7));

9(d) Maximize, to the extent feasible, additional environmental and economic benefits for California, as appropriate (Health & Saf. Code, § 38570(b)(3)); and

10. To the extent feasible, ensure that oil and natural gas providers are not required to meet duplicative or inconsistent regulatory requirements (Health & Saf. Code, § 38501(g), and 38561(a)).

C. Description of the Proposed Regulation and Reasonably Foreseeable Compliance Responses

The Proposed Regulation contains provisions that will reduce the amount of methane emitted during oil and gas production, processing, storage, and transmission compressor stations, by requiring regulated entities to take actions to limit vented and fugitive methane emissions from equipment and operations. The elements of the Proposed Regulation, which are described in greater detail below, are as follows:

- Vapor collection on uncontrolled oil and water separators, tanks, and sumps with emissions above a set methane emission standard;
- Control of vapors from uncontrolled well stimulation circulation tanks;
- Leak Detection and Repair (LDAR) on components, such as valves, flanges, and connectors currently not covered by local air district rules;
- Inspection and repair requirements for reciprocating natural gas compressors;
- Vapor collection or flow rate standard for reciprocating compressors, rod packing at natural gas gathering and boosting stations, processing plants, transmission compressor stations, and underground natural gas storage facilities;
- Vapor collection of centrifugal compressor wet seal vent gas, or replacement of higher emitting “wet seals” with lower emitting “dry seals”;
- Replacement of pneumatic pumps, and replacement or retrofitting of pneumatic devices under certain circumstances;

- Measurement and reporting or vapor collection of vented natural gas from liquids unloading and from well casing vents;
- Measurement and reporting of vented natural gas from well casing vents open to the atmosphere; and
- Enhanced monitoring at natural gas underground storage facilities.

The Proposed Regulation would establish uniform control requirements for methane sources and expand upon some existing local air district VOC regulations by including additional infrastructure components (such as valves, flanges, and seals) that would not currently be covered by those programs. The Proposed Regulation includes requirements to ensure that there would be no substantial net increase in criteria air pollutant emissions, including oxides of nitrogen (NOx): methane and VOC emissions. The Proposed Regulation would require vapors, primarily from separator and tank systems, to be collected and conveyed into existing sales lines, existing fuel lines, or existing injection wells first, with the use of existing vapor control devices that meet a low NOx standard as the next option. . New vapor control devices would be installed if other options are not feasible. The Proposed Regulation would not cover methane controls from natural gas transmission or distribution outside of underground natural gas storage and transmission compressor stations.

The following provides an overview of the Proposed Regulation and the associated reasonably foreseeable compliance responses that could occur as a result of implementation.

1. Vapor Collection on Uncontrolled Oil and Water Separators, Tanks, and Sumps with Emissions above a Set Methane Standard

In the oil and natural gas sector, pressure vessels, tanks, separators, and sumps are used to separate or store emulsion, natural gas, crude oil, condensate, or produced water. A separation and tank system includes the oil/water separator and any tank or sump connected directly to the oil/water separator. Methane losses from this equipment are primarily the result of flashing emissions, which occur when methane that is entrained in the liquid under high pressure in an underground reservoir is allowed to flash (or partially evaporate) from the liquid in these lower pressure vessels on the surface.

a) Proposed Regulatory Actions

The Proposed Regulation would require that uncontrolled separators, tanks, or sumps (i.e., not sealed or controlled with a vapor collection system) either install a vapor collection system or conduct flash analysis testing to determine whether additional vapor collection and disposal methods must be employed. Regulated entities would likely choose to conduct flash analysis testing before installing a vapor collection system. If any one of the regulated components in the separation and tank system is uncontrolled (i.e., a partially controlled system), testing must be completed. The

Proposed Regulation exempts systems under certain production levels from testing as they are expected to be well below the threshold for controls. If the measured flash emission rate is less than or equal to 10 metric tons per year of methane, no further action would be required other than periodic flash testing and reporting. If the measured flash emission rate is greater than 10 metric tons per year of methane, vapor collection and disposal methods must be employed. Only pressure vessels used to separate oil and water would be subject to these vapor collection requirements.

If vapor collection systems are installed, they would consist of a series of gathering lines that draw vapors out of the pressure vessel, tank, separator, or sump under low pressure and then direct the vapors to a separator or suction scrubber to collect any condensed liquids, which are then recycled back to the equipment. Vapors from the separator flow through a compressor that provides the low-pressure suction for the vapor collection system (U.S. EPA 2003).

The Proposed Regulation would require that the vapor collection systems comply with the following order of options, depending on technical feasibility: 1) direct vapors to the sales gas system, fuel gas system, or to an existing gas disposal well; 2) destroy vapors in a vapor control device. If located within a non-attainment area, the vapor control device must meet a low NOx standard; 3) if the above options are not feasible, remove the equipment from service. If equipment is removed from service, necessary closure and/or abandonment procedures would be completed in compliance with applicable laws and regulations. In lieu of completed closure and/or abandonment, vapor may be routed to other facilities that comply with the Proposed Regulation.

For facilities without existing vapor control devices installed, a new control device may be installed in accordance with the terms of the Proposed Regulation. For facilities currently operating a vapor control device, the Proposed Regulation may result in additional vapors being routed to the device. If additional vapors are routed to the device, the regulated entity must ensure it is compliant, or replace it to become compliant, with the terms of the Proposed Regulation.

In areas classified as nonattainment with, or which have not been classified as in attainment of, all state and federal ambient air quality standards (i.e., ozone, respirable particulate matter [PM_{10}], fine particulate matter [$PM_{2.5}$], carbon monoxide [CO], nitrogen dioxide [NO_2], sulfur dioxide [SO_2]), allowable devices would be limited to non-destructive vapor control devices[9], or low-NOx[10] vapor control devices. In areas classified as in attainment with all state or federal ambient air quality standards, allowable devices would be limited to those that achieve 95 percent vapor control efficiency of total emissions. It is likely that all existing vapor control devices meet the 95

[9] A device that achieve 95 percent vapor control efficiency and does not result in emissions of NOx

[10] A device that achieves 95 percent vapor control efficiency and does not generate more than 15 parts per million volume NOx when measured at 3 percent oxygen.

percent control efficiency requirement; therefore, in attainment areas, ARB is assuming that no equipment replacement would be necessary for compliance with the Proposed Regulation. For the purpose of this evaluation, it is reasonably foreseeable to assume that all replacement devices or newly installed vapor control devices would be low-NOx combustion devices, because all oil and gas producing air districts are currently in nonattainment for at least one of the state or federal ambient air quality standards and non-destructive devices are not currently available. The installation of any vapor control device would be subject to all applicable federal, state, and local requirements. Additionally, the Proposed Regulation would require that pressure vessels and components on separators, tanks, or sumps be leak-free (see discussion on LDAR).

b) Reasonably Foreseeable Compliance Responses

Reasonably foreseeable compliance responses include the construction and operation of new vapor collection systems. New gathering lines and piping would be installed to direct vapors to the permissible disposal process, which would occur within an established oil or gas field, and may be buried approximately 4 to 5 feet below ground. Additionally, low-NOx combustion devices would be installed in some circumstances, either as new equipment or in replacement of an existing flare. Construction activities resulting from the Proposed Regulation could require disturbance of undeveloped areas, such as clearing of vegetation, earth movement and grading, and trenching for piping installation. In general, the potential to result in these types of disturbances would be associated with trenching for new piping or preparation for construction staging areas.

Destruction of vapors or disposal in an underground gas disposal well would likely be used if the vapors collected are not suitable for onsite use and do not meet pipeline quality standards. Underground gas disposal could only occur if an established, permitted, onsite gas disposal well is available. Drilling of new wells would not be anticipated to result from implementation of the Proposed Regulation. However, if a regulated entity increases gas disposal injection rates into current wells, DOGGR analysis and approval would be required. (Please see Section 1.C.1 for a discussion related to Class II underground injection wells.)

In the event that it is infeasible to control emissions from sumps, it reasonable to assume that the sump would be removed from service and a new tank would be installed. This may require remediation for the abandoned sump and additional construction related activities with the installation of the new tank. The use or abandonment of sumps is regulated under SWRCB (see Attachment 1 for more information).

2. Control of Vapors from Uncontrolled Well Stimulation Circulation Tanks

In California, the recovered fluid from a well stimulation treatment is generally conveyed to a circulation tank where water and hydrocarbon liquids are circulated in order to

remove excess proppant from the fluid. In many cases this activity results in gas vented to the atmosphere.

a) Proposed Regulatory Actions

The Proposed Regulation would require regulated entities to either control emissions from the circulated liquids (recovered well stimulation fluids) prior to conveyance of recovered fluid to the circulation tank or control emissions from the circulation tank. To control emissions from the circulated liquids, the regulated entity would route the recovered fluids through a portable separator or a pressure vessel. This system would separate vapor from the liquids, and deposit the remaining fluid into the circulation tank. The recovered vapors could then be disposed of using the same methodology as described in Chapter 2.C.1.a or compressed and transferred offsite.

b) Reasonably Foreseeable Compliance Responses

Reasonably foreseeable compliance responses associated with processing the captured vapors include the construction and operation of new vapor collection systems. Gathering lines and piping would need to be installed to route gases to the vapor disposal process. Installation and construction of new piping to direct vapors to the permissible disposal process would likely occur within an established oil or gas field, and could be installed approximately 4 to 5 feet underground. Collected vapors would then be disposed of using the same methodology as described in Chapter 2.C.1.b.

3. Leak Detection and Repair on Components, such as Valves, Flanges, and Connectors Currently not Covered by Local Air District Rules

Fugitive emissions are the unplanned losses of methane from pipes, flanges, seals, or through the moving parts of valves, pumps, compressors, and other types of equipment and components. LDAR describes the process of locating and repairing these fugitive leaks. There are a variety of techniques and types of equipment that can be used to locate and quantify these fugitive emissions. Generally, LDAR programs establish a routine interval (such as annual or quarterly inspections) for surveying equipment to detect leaks, identify the procedure to conduct the survey, establish thresholds and timelines for repair, in addition to recordkeeping and reporting requirements.

The primary method for monitoring to detect leaking components is U.S. EPA Reference Method 21 (Code of Federal Regulations, tit. 40, Part 60, Appendix A), which is a procedure used to detect VOC leaks from process equipment using an analyzer, such as a portable Organic Vapor Analyzer or Toxic Vapor Analyzer. A secondary method uses optical gas imaging instruments. In many areas of the state, local air districts include LDAR programs in their existing VOC permitting programs for oil and natural gas facilities, these programs are implemented by the permitted entity or their designee.

a) Proposed Regulatory Actions

The Proposed Regulation would require quarterly inspections for components not covered by a district rule[11], and incorporate leak thresholds and repair requirements specific for methane. This would expand the number of facilities and components covered under existing LDAR programs. In areas of the state without existing LDAR requirements for VOCs, the Proposed Regulation would establish minimum LDAR requirements for methane and require the regulated entities to establish a new LDAR program meeting those requirements.

b) Reasonably Foreseeable Compliance Responses

Reasonably foreseeable compliance responses associated with implementation of LDAR programs would include the repair, retrofit, or replacement of leaking equipment and components within the footprint of established oil or gas fields. In addition, the Proposed Regulation would also require implementation of improved management practices for reducing vented emissions, such as keeping hatches, or other access point on storage tanks, closed and properly sealed during normal operation or sealing open-ended lines and valves. These types of improved management practices would occur within the footprint of the oil and natural gas field operation. No construction or earthmoving activities would be required to comply with LDAR programs.

4. Inspection and Repair Requirements for Reciprocating Natural Gas Compressors

Compressors are mechanical devices that increase the pressure of natural gas and allow the natural gas to be transported from the production site, through the supply chain, and to the consumer. Typically, two types of compressors are used in oil and natural gas operations: 1) reciprocating compressors, and 2) centrifugal compressors. In a reciprocating compressor, natural gas is compressed by a piston driven in a reciprocating motion by the crankshaft powered by an internal combustion engine. Over the operating life of the reciprocating compressor, the flexible rings that create the seal around the reciprocating compressor piston rod become worn and the packing system begins to wear, resulting in higher leak rates. Emissions from packing systems originate mainly from four components: the nose gasket, between the packing cups, around the rings, and between the rings and the shaft. These emissions are traditionally vented to the atmosphere (U.S. EPA 2014a).

a) Proposed Regulatory Actions

The Proposed Regulation would require that the components on driver engines for reciprocating natural gas compressors at all facilities must be leak-free (see discussion on LDAR, above).

[11] Under the Proposed Regulation, inspection frequency may be reduced to annual inspections if certain conditions are met. However, the analysis conducted herein assumes quarterly inspections.

b) Reasonably Foreseeable Compliance Responses

Reasonably foreseeable compliance responses include regulated entities making successful repairs to, or replacement of, the compressor. Generally, this occurs at the location of the existing compressor (see discussion on LDAR, above).

5. Vapor Collection or Flow Rate Standard for Reciprocating Compressor Rod Packing at Natural Gas Gathering and Boosting Stations, Processing Plants, Transmission Compressor Stations, and Underground Natural Gas Storage Facilities

a) Proposed Regulatory Actions

The Proposed Regulation would require that, if the emissions from rod packing or seal vent gas exceeds the standard defined in the Proposed Regulation, natural gas gathering and boosting stations, transmission compressor stations, and underground storage facilities make successful repairs, remove the compressor from service, or collect the rod packing or seal emission vent gas using a vapor collection system.

b) Reasonably Foreseeable Compliance Responses

Reasonably foreseeable compliance responses include regulated entities making successful repairs to, or replacement of, the compressor. Generally, this occurs at the location of the existing compressor. However, if collection of the rod packing or seal emission vent gas occurs, gathering lines and piping would need to be installed to route gases to the vapor disposal process. Installation and construction of new piping to direct vapors to the permissible disposal process would likely occur within an established oil or gas field, and could be installed approximately 4 to 5 feet underground. Collected vapors would then be disposed of using the same methodology as described in Chapter 2.C.1.b.

6. Vapor Collection of Wet Seal Centrifugal Compressor Vent Gas, or Replacement of Higher Emitting “Wet Seals” with Lower Emitting “Dry Seals”

Centrifugal compressors use a rotating disk or impeller to increase the velocity of the gas and then convert the velocity energy to pressure energy. Centrifugal compressors are equipped with either a wet or dry seal configuration. Gas emissions from wet seal centrifugal compressors have been found to be higher than from dry seal compressors, primarily due to off-gassing of the entrained gas from the oil (U.S. EPA 2014a).

a) Proposed Regulatory Actions

The Proposed Regulation would require that components on centrifugal compressors and engines and turbines be leak free (see discussion on LDAR). In addition, if the emission flow rate from a wet seal centrifugal compressor exceeds the standard defined in the Proposed Regulation the regulated entity must minimize flow and replace with a

dry seal within the timeframe specified or collect the wet seal vent gas using a vapor collection system.

b) Reasonably Foreseeable Compliance Responses

Reasonably foreseeable compliance responses include regulated entities replacing the wet seal centrifugal compressor with a dry seal centrifugal compressor. If necessary, this replacement would occur at the location of the existing centrifugal compressor. However, if collection of the vent gas using a vapor collection system occurs, gathering lines and piping would need to be installed to route gases to the vapor disposal process, as described above. Installation and construction of new piping to direct vapors to the permissible disposal process would likely occur within an established oil or gas field, and could be installed approximately 4 to 5 feet underground. Collected vapors would then be disposed of using the same methodology as described in Chapter 2.C.1.b.

7. Replacement of Pneumatic Devices and Pumps

Pneumatic devices are used for maintaining a process condition such as liquid level, pressure, pressure differential, and temperature, and are widespread throughout oil and natural gas operations. Pneumatic controllers typically use high pressure natural gas to operate the control, releasing natural gas with every actuation of the valve. These gas powered pneumatic controllers fall into three basic designs: 1) continuous bleed controllers, used to modulate flow, liquid level, or pressure, for which gas is vented continuously; 2) intermittent controllers, which release gas only when they open or close a valve or as they throttle the gas flow; and 3) zero-bleed controllers, which are self-contained devices that release gas into downstream piping. Generally, the industry classifies gas powered pneumatic devices by the rate at which they “bleed” natural gas, with *low-bleed* controllers having a bleed rate of less than or equal to six standard cubic feet per hour (scfh) and *high-bleed* controllers having a bleed rate of greater than six scfh (U.S. EPA 2014b). Instrument air systems substitute compressed air for the pressurized natural gas, eliminating methane emissions, and electric pneumatic controllers are available; however, both are limited to those field sites with available electrical power, either from utility or self-generated sources. Pneumatic pumps use pressurized natural gas to power a piston or diaphragm in order to circulate or pump liquids. The majority of pneumatic pumps used in oil and natural gas production are used for chemical injection or glycol circulation (or “Kimray” pumps).

a) Proposed Regulatory Actions

The Proposed Regulation would allow for some continuous bleed pneumatic devices to remain in operation provided certain requirements are met, such as installation prior to January 1, 2016 and a bleed rate of equal to or less than six scfh. This equipment would need to be identified with a permanent tag affixed to the unit, be tested in accordance with the LDAR requirements, and any device measuring above six scfh would need to be repaired or replaced within the specified timeframe. For all other continuous bleed pneumatic devices and pneumatic pumps designed to vent natural gas during

operation, the Proposed Regulation would require that these equipment not vent natural gas to the atmosphere and be leak-free or no-bleed. Additionally, the Proposed Regulation requires intermittent leak pneumatic devices be leak-free when not actuating (see discussion on LDAR).

b) Reasonably Foreseeable Compliance Responses

Reasonably foreseeable compliance responses include retrofitting or replacement of pneumatic devices and pumps with similar devices that meet the leak-free or no venting standard; collecting vapors using a vapor collection system; or using compressed air or electricity to operate. Replacement of an existing pneumatic device or pump would likely occur at the location of the existing pneumatic device or pump. However, if vented natural gas is collected from continuous bleed pneumatic devices and pumps, gathering lines and piping would need to be installed to route gases to the vapor disposal process. Installation and construction of new piping to direct vapors to the permissible disposal process would likely occur within an established oil or gas field, and could be installed approximately 4 to 5 feet underground. Collected vapors would then be disposed of using the same methodology as described in Chapter 2.C.1.b.

8. Measurement and Reporting of Vapor Collection of Vented Natural Gas from Liquids Unloading and From Well Casing Vents

Over time, natural gas wells accumulate liquids that can impede and sometimes halt gas production. When the accumulation of liquid results in the slowing or cessation of gas production, removal of fluids (e.g., liquids unloading) is required in order to maintain production. Gas flow is maintained by removing accumulated fluids through the use of specialized equipment installed in the well, such as velocity tubing or a plunger lift system; the use of remedial treatments such as swabbing or soaping; or, by venting the well to atmospheric pressure (referred to as “blowing down” the well) (U.S. EPA 2006).

A well casing vent is an opening on a well head that blocks or allows natural gas to flow to the atmosphere

a) Proposed Regulatory Actions

The Proposed Regulation would require regulated entities that vent natural gas wells for the purpose of liquids unloading or from well casing vents to: 1) measure and report the volume of natural gas vented; 2) calculate and report the volume of natural gas vented using a specified calculation methodology; or 3) collect vapors using a vapor collection system.

b) Reasonably Foreseeable Compliance Responses

Reasonably foreseeable compliance responses include regulated entities measuring or calculating and reporting the volume of natural gas vented. However, if vented natural gas is collected into a vapor collection system, gathering lines and piping would need to be installed to route gases to the vapor disposal process. Installation and construction

of new piping to direct vapors to the permissible disposal process would likely occur within an established oil or gas field, and could be installed approximately 4 to 5 feet underground. Collected vapors would then be disposed of using the same methodology as described in Chapter 2.C.1.b.

9. Measurement and Reporting of Vented Natural Gas from Well Casing Vents Open to the Atmosphere

A well casing vent is an opening on a well head that blocks or allows natural gas to flow to the atmosphere or to a vapor collection system.

a) Proposed Regulatory Actions

The Proposed Regulation would require regulated entities that vent natural gas wells to the atmosphere from a well casing vent measure and report the volume of natural gas vented.

b) Reasonably Foreseeable Compliance Responses

Reasonably foreseeable compliance responses include regulated entities measuring and reporting the volume of natural gas vented.

10. Enhanced Monitoring at Natural Gas Underground Storage Facilities

Natural gas is most commonly held in inventory underground under pressure in three types of facilities: depleted reservoirs in oil and/or natural gas fields, aquifers, and salt cavern formations. In 2014, California had 14 natural gas underground storage sites - 13 depleted oil and natural gas reservoirs and 1 saline aquifer - with a total working gas capacity[12] of about 374 billion cubic feet (EIA 2015b, EIA 2008). The wells located at these facilities may function in both a natural gas injection and withdrawal capacity. These wells may be newly constructed or repurposed oil or natural gas production wells. Additionally, abandoned or idle wells may be located at facilities that were previous oil or natural gas production fields.

a) Proposed Regulatory Actions

The Proposed Regulation would require that each owner or operator of a natural gas underground storage facility submit a plan to monitor ambient air at the facility and screen each well at the facility and surrounding area daily for the early detection of leaks or failure.

[12] Working capacity is the volume of total natural gas storage capacity that contains natural gas available for withdrawal.

b) Reasonably Foreseeable Compliance Responses

Reasonably foreseeable compliance responses include continuous monitoring of ambient air for natural gas emissions. ARB anticipates that each facility will install one ambient air monitor, likely on an existing structure. Implementation of a daily leak detection plan may incorporate installation of a stationary grid gas detection system or by installing sensors at each wellhead. The sensors may connect to the control room(s) using wireless or wire-based technology. In the event a wire-based technology is used, the transmission wires may be buried underground. The alarm systems would be required to be tested quarterly and, if defective, repaired or replaced within the specified timeframe. Alternatively, a regulated entity may incorporate wellhead inspection with handheld devices into the daily leak detection plan. However, ARB staff believe that the costs associated with this practice may make it less likely to be used as a compliance response unless a regulated entity is already completing similar inspections as part of their current business practices. For the purposes of the impact analysis, ARB assumes that compliance with the daily monitoring requirements will be achieved through installation of the grid detection system or through installation of wellhead sensors.

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3.0 ENVIRONMENTAL AND REGULATORY SETTING

The California Environmental Quality Act (CEQA) Guidelines require an environmental impact report (EIR) to include an environmental setting section that discusses the current environmental conditions in the vicinity of the project. This environmental setting normally constitutes the baseline physical conditions against which an impact is compared to determine whether or not it is significant (Cal. Code Regs., tit. 14 § 15125). As discussed in Chapter 1 of this Draft Environmental Analysis (Draft EA), the California Air Resources Board (ARB or Board) has a CEQA certified regulatory program and prepares an environmental analysis (EA) in lieu of an EIR. This Draft EA is a functional equivalent to an EIR under CEQA therefore, in an effort to comply with the policy objectives of CEQA, an environmental setting and a regulatory setting with environmental laws and regulations relevant to the Proposed Regulation have been included as Attachment 1 to this Draft EA.

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4.0 IMPACT ANALYSIS AND MITIGATION MEASURES

A. Approach to the Environmental Impacts Analysis and Mitigation Measures

This chapter contains an analysis of environmental impacts and mitigation measures associated with the Proposed Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities (Proposed Regulation). The California Environmental Quality Act (CEQA) states the baseline for determining the significance of environmental impacts would normally be the existing conditions at the time the environmental review is initiated (Cal. Code Regs., tit. 14, § 15125(a)). Therefore, significance determinations reflected in this Draft Environmental Analysis (Draft EA) are based on a comparison of the potential environmental consequences of the Proposed Regulation with the regulatory setting and physical conditions in 2015 (see Attachment 1). For the purpose of determining whether the Proposed Regulation has a potential effect on the environment, the Air Resources Board (ARB or Board) evaluated the potential physical changes to the environment resulting from the reasonably foreseeable compliance responses described in further detail in Chapter 2 of this Draft EA. A table summarizing all of the potential impacts and proposed mitigation for each resource area discussed below is included at Attachment 2 to this document.

The reasonably foreseeable compliance responses associated with the Proposed Regulation are analyzed in a programmatic manner for several reasons: (1) any individual action or activity would be carried out under the same authorizing regulatory authority; (2) the reasonably foreseeable compliance responses would result in generally similar environmental effects that can be mitigated in similar ways (Cal. Code Regs., tit. 14 § 15168(a)(4)); and (3) while the types of foreseeable compliance responses can be reasonably predicted, the specific location, design, and setting of the potential actions cannot feasibly be known at this time. If a later activity would have environmental effects that are not examined within this Draft EA, the public agency with authority over the later activity would be required to conduct additional environmental review as required by CEQA or other applicable law.

The analysis is based on reasonably foreseeable compliance responses that are based on a set of reasonable assumptions. While the compliance responses described in this Draft EA are not the only conceivable ones, they provide a credible basis for impact conclusions that is consistent with available evidence. The analysis also includes actions that could likely occur under a broad range of the potential scenarios. The impact discussions reflect a conservative assessment to describe the type and magnitude of effects that may occur (i.e., in that the conclusions tend to overstate adverse effects) because the specific location, extent, and design of potential new and/or modified facilities cannot be known at this time.

1. Significant Adverse Environmental Impacts and Mitigation Measures

The analysis of potentially significant adverse impacts on the environment, and significance determinations for those effects, reflect the programmatic nature of the analysis of the reasonably foreseeable compliance responses of the regulated entities. These reasonably foreseeable compliance responses are described in more detail in Chapter 2 of this Draft EA. The Draft EA analysis addresses broadly defined types of impacts or actions that may be taken by others in the future as a result of implementation of the Proposed Regulation.

This Draft EA takes a conservative approach and considers some environmental impacts as potentially significant because of the inherent uncertainties in the relationship between physical actions that are reasonably foreseeable under the Proposed Regulation and environmentally sensitive resources or conditions that may be affected. This conservative approach tends to overstate environmental impacts in light of these uncertainties and is intended to satisfy the good-faith, full-disclosure intention of CEQA. If and when specific projects are proposed and subjected to project-level environmental review, it is expected that many of the impacts recognized as potentially significant in this Draft EA can later be avoided or reduced to a less-than-significant level.

The Draft EA contains a degree of uncertainty regarding implementation of mitigation for potentially significant impacts. The programmatic analysis in this Draft EA does not allow for a precise description of the details of project-specific mitigation because ARB cannot predict the location, design, or setting of specific compliance responses that may result, and does not have authority over implementation of specific infrastructure projects that may occur. As a result, there is inherent uncertainty in the degree of mitigation that would ultimately need to be implemented to reduce any potentially significant impacts identified in this Draft EA. Consequently, this Draft EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable, where appropriate. It is also possible that the amount of mitigation necessary to reduce environmental impacts to below a significant level may be far less than disclosed in this Draft EA on a case-by-case basis. It is expected that many individual development projects would be able to feasibly avoid or mitigate to a less-than-significant level. If a potentially significant environmental effect cannot be feasibly mitigated with certainty, this Draft EA identifies it as potentially significant and unavoidable.

Where applicable, consistent with ARB's certified regulatory program requirements (Cal. Code Regs., tit. 17 § 60005(b)), this Draft EA also acknowledges potential beneficial effects on the environment in each resource area that may result from implementation

of the Proposed Regulation. Any beneficial impacts associated with the Proposed Regulation are included in the impact analysis for each resource area listed below.

B. Resource Area Impacts and Mitigation Measures

The following discussion provides a programmatic analysis of the reasonably foreseeable compliance responses that could result from implementation of the Proposed Regulation, described in Chapter 2 of this Draft EA. The impact analysis is organized by environmental resource areas in accordance with the topics presented in the Environmental Checklist in Appendix G to the CEQA Guidelines (Cal. Code Regs., tit. 14 § 15000 et. seq). These impact discussions are followed by the types of mitigation measures that could be required to reduce potentially significant environmental impacts.

1. Aesthetics

Impact 1.a: Short-Term Construction-Related Impacts on Aesthetics

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation of vapor collection systems, ambient air or leak detection monitors, and repair or replacement of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, low-oxides of nitrogen (NOx) combustion devices, tanks, valves, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Depending on the size and scope of the modifications, construction equipment could range from earth-moving equipment such as backhoes and excavators to hand and power tools to install smaller devices (e.g., valves, flanges). As described in Section 2.A, above, oil and gas facilities are often located in areas zoned for industrial uses; however, wells and equipment may also be located in residential areas or within the boundaries of incorporated cities (e.g., Long Beach, Los Angeles). In general, oil and gas facilities exist on sites that are, or have been, subjected to severe disturbance including grading, trenching, paving, and construction of roads and structures. Existing daily activities often include the presence of humans, movement of automobiles, trucks and heavy equipment, and operation of stationary equipment. Implementation of the Proposed Regulation would add additional maintenance, inspection, and upgrade requirements; however, these would not be substantial compared to the existing operations and would not affect the visual character of individual sites. Construction activities associated with the Proposed Regulation would be of similar scale and size to current maintenance and associated upgrades that occur within oil and gas facilities.

While construction or installation of some of these features could potentially alter the appearance of some existing visual settings, the presence of construction equipment would not substantially affect the visual character of an industrial site because a variety

of operation and maintenance activity is typical within oil and gas facilities. Because individual project sites would be located within highly disturbed, industrial areas, no scenic vistas or scenic resources would be adversely affected. Thus, short-term construction-related impacts on aesthetic resources would be **less-than-significant**.

Impact 1.b: Long-Term Operational Impacts on Aesthetics

The reasonably foreseeable compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, valves, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities. Generally these systems or sensors would be small in size and similar to other systems and sensors already located at the facilities or on the wellhead. All of these features are consistent with the existing visual character of an oil and gas facility. Implementation of the Proposed Regulation would result in installation of new low-NOx combustion devices. The flame on a low-NOx combustion device is completely enclosed; therefore, these devices would not generate new sources of light to an area or generally be inconsistent with the existing character of an individual facility. The Proposed Regulation would require that facilities currently operating a non-compliant (i.e., a flare with an open flame) vapor control device that would be processing additional vapor throughput replace the non-compliant vapor control device with a new low-NOx combustion device (i.e., flame would be completely enclosed). Compliance with the Proposed Regulation could result in a reduction of visible flare at oil and gas facilities that currently use flares, potentially improving both daytime and nighttime views. Thus, long-term operational impacts on aesthetic resources would be **less-than-significant**.

2. Agricultural and Forest Resources

Impact 2.a: Short-Term Construction-Related and Long-Term Operational Impacts on Agricultural and Forest Resources

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Oil and gas facilities are often located in areas zoned for industrial uses; however, wells and equipment may also be located in residential areas or within the boundaries of incorporated cities and on grazing lands at lease. While the Proposed Regulation

covers both existing and new facilities that have not yet been constructed, the Proposed Regulation would not incentivize or otherwise increase the number of oil and gas facilities in California, but would regulate potential sources of methane leaks into the atmosphere through maintenance, inspection, and upgrade requirements. Installation of underground piping would be limited to existing facility boundaries; the quantities of vapors collected as a result of the Proposed Regulation would not be considered substantial enough to make construction of a natural gas transmission line economically feasible. No conversion of agricultural or forest resources would be required or expected through implementation of the Proposed Regulation. Thus, short-term construction-related and long-term operational impacts on agricultural and forest resources would be **less-than-significant**.

3. Air Quality

Impact 3.a: Short-Term Construction-Related Impacts on Air Quality

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Any proposed modifications to facilities would require having applicable local or State land use approvals secured prior to their implementation. Part of the development review and approval process for projects located in California requires environmental review consistent with California environmental laws (e.g., CEQA) and other applicable local requirements (e.g., local air quality district rules and regulations). The environmental review process would include an assessment of whether or not implementation of such projects could result in short-term construction-related air quality impacts.

At this time, the specific location, type, and number of construction activities is not known and would be dependent upon a variety of factors that are not within the control or authority of ARB and not within its purview. Thus, ARB has not quantified the potential construction-related emission impacts as these would be too speculative to provide a useful evaluation tool. Nonetheless, the analysis presented herein provides a good-faith disclosure of the general types of construction emission impacts that could occur with implementation of these reasonably foreseeable compliance responses. Further, subsequent environmental review would be conducted at such time that an individual project is proposed and land use or construction approvals are sought. The short-term construction related impacts would be primarily due to installation of low-NOx

combustion devices, vapor collection systems (e.g., gathering lines, piping), and communication wires for well monitoring alarms. Although detailed construction information is not available at this time, based on the types of activities that could be conducted, it would be expected that the primary sources of construction-related emissions include soil disturbance- and equipment-related activities (e.g., use of backhoes, bulldozers, excavators, and other related equipment).

Generally, it is expected that during the construction phase for any facilities, criteria air pollutants and toxic air contaminants (TACs) could be generated from a variety of activities and emission sources. These emissions would be temporary and occur intermittently depending on the intensity of construction on a given day. Site grading and excavation activities would generate fugitive particulate matter (PM) dust emissions, which is the primary pollutant of concern during construction. Fugitive PM dust emissions (e.g., respirable particulate matter [PM_{10}] and fine particulate matter [$PM_{2.5}$]) vary as a function of several parameters, such as soil silt content and moisture, wind speed, acreage of disturbance area, and the intensity of activity performed with construction equipment. Exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips could also contribute to short-term increases in PM emissions, but to a lesser extent. It is probable that transport of light equipment and personnel for construction activities would take place using light duty trucks, while transport of heavy equipment or bulk materials would be hauled in heavy duty trucks. Exhaust emissions from construction-related mobile sources also include reactive organic gases (ROG) and NO_X. These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment. ARB implements several regulations with the purpose of reducing NOx, PM, and imposing limits on idling from in-use vehicles and equipment - the Truck and Bus Regulation, the Regulation for In-Use Off-Road Diesel Fueled Fleets, and the Portable Engine Airborne Toxic Control Measure. Much of the equipment used during the construction phase would be subject to these regulations.

The site preparation phase typically generates the most substantial emission levels because of the on-site equipment and ground-disturbing activities associated with grading, compacting, and excavation. However, the types of upgrades and modifications to oil and gas facilities that could be required under the Proposed Regulation would be minimal, consisting of activities such as installation of piping, gathering lines, tanks, valves, and hatches. Thus, short-term construction-related impacts on air quality would be **less-than-significant**.

Impact 3.b: Long-Term Operational Impacts on Air Quality

Despite the dramatic emission reductions and air quality improvements achieved to date, most urban areas of California, including Southern California, the Bay Area, and the Central Valley continue to exceed the State and National ambient air quality standards for ozone. Many of these same regions also exceed the standards for $PM_{2.5}$. Long-term operations resulting from compliance responses associated with the

Proposed Regulation could include the combustion of methane vapors as a management option for captured methane gas and increased vehicle use as a result of inspections, equipment replacement and repairs, and transporting compressed vapor. These compliance responses have the potential to increase emissions from the pollutants for which standards have been established. The Proposed Regulation is designed to require the cleanest combustion devices, consequently reducing any potential additional air quality emission impacts in nonattainment areas to below significance, and would not affect the attainment status of areas currently in attainment. Specifically, though some newly-collected vapors may be combusted, the Proposed Rule requires that inefficient combustion devices already in use be replaced with cleaner devices before they can be used for compliance. As shown below, this means that the Proposed Regulation ensures that no significant increases would occur in nonattainment areas, and could result in a net reduction of emissions for some areas and pollutants.

a) Vehicle Emissions

Implementation of the Proposed Regulation would result in an incremental increase to vehicle miles travelled (VMT). This incremental increase in VMT primarily results from vehicles needed to achieve compliance with the Leak Detection and Repair (LDAR) requirements of the Proposed Regulation. The incremental fuel consumption associated with this VMT translates to additional emissions of VOCs, NOx, carbon monoxide (CO), carbon dioxide (CO_2), and, for diesel fueled vehicles, PM.

The Proposed Regulation would expand the number of facilities and components subject to inspection and the frequency of inspection may be more often for the additional components and facilities. Table 4-1 provides information regarding the inspection frequency of existing air district LDAR programs. In many cases, the requirements of the Proposed Regulation could be coordinated with existing monitoring requirements for VOCs and other emissions. For example, the primary oil producing regions of the State (e.g., San Joaquin Valley, South Coast, and Central Coast) all currently have LDAR programs that require quarterly inspections. In these areas, air district inspectors and regulated entities are likely already visiting the sites covered under the Proposed Regulation and may only be adding inspections of additional components at those sites or adding components at natural gas facilities. However, there are some areas of the state where monitoring requirements do not currently exist, such as the dry gas producing regions in Colusa County, Glenn County, and Feather River. In these areas, the Proposed Regulation would require the regulated entities to establish new LDAR programs. Table 4-2 provides estimates on the number of additional components, by air district, that would be required to be inspected under the proposed LDAR requirements that would require additional travel. The additional components are primarily found at natural gas facilities, since components at crude oil facilities are already covered under current district LDAR programs for VOCs. Attachment 3 provides a more detailed description of ARB's development of the component counts that are used in this analysis. Many local air districts currently use

fuel efficient or low-emitting vehicles (e.g., hybrid vehicles) to conduct inspections and it is likely that even more low-emitting vehicles (i.e., plug-in hybrid, zero emission vehicles) will be used in the future. Regulated entities and contracted inspection operators are expected to use light heavy-duty work trucks (gross vehicle weight rating of 8,501-10,000 pounds) to conduct inspections.

The Proposed Regulation would require that equipment with leaks that exceed the thresholds established in the regulation be repaired or replaced within a specified timeframe. The additional VMT associated with equipment repairs or replacement is expected to be minimal. Minor repairs, generally along the lines of tightening a valve or fitting, would likely be undertaken at the time of monitoring and inspection. Larger repairs may require replacement parts or equipment requiring additional trips to the facility. However, these repairs would need to be made regardless of the proposed LDAR program; therefore, this analysis does not attribute any additional vehicle miles to the Proposed Regulation for these larger repairs. Overall, the additional miles to and from the oil and gas facilities to comply with the LDAR component of the Proposed Regulation, would not be substantial and would be infrequent (e.g., quarterly) in nature.

Table 4-1 Air District LDAR Programs		
District	**LDAR Rule**	**Inspection Frequency**
Antelope Valley AQMD	Rule 1173 - Fugitive Emissions of VOCs	Quarterly
Bay Area AQMD	Rule 8-37 - Natural Gas and Crude Oil Production Facilities	Not specified
Butte County AQMD	NA	
Calaveras County APCD	NA	
Colusa County APCD	NA	
Eastern Kern APCD	Rule 414.1 – Valves, Pressure Relief Valves, Flanges, Threaded Connections and Process Drains at Petroleum Refineries and Chemical Plants*	
El Dorado County AQMD	Rule 245 - Valves and Flanges	Quarterly
Feather River AQMD	NA	
Glenn County APCD	NA	
Great Basin Unified APCD	NA	
Imperial County APCD	NA	
Lake County AQMD	NA	
Lassen County APCD**	NA	
Mariposa County APCD	NA	
Mendocino County AQMD	NA	
Modoc County APCD**	NA	
Mojave Desert AQMD**	Rule 1102 – Fugitive Emissions of VOCs from Components at Pipeline Transfer Stations***	
Monterey Bay Unified APCD	Rule 427 - Steam Drive Crude Oil Production Wells	Quarterly
North Coast Unified AQMD	NA	
Northern Sierra AQMD	NA	
Northern Sonoma County APCD	NA	
Placer County APCD	NA	
Sacramento Metropolitan AQMD	Rule 464 - Organic Chemical Manufacturing Operations	Semiannually
San Diego County APCD**	Rule 61.7 - Spillage and Leakage of Volatile Organic Compounds	Not Specified

Table 4-1
Air District LDAR Programs

District	LDAR Rule	Inspection Frequency
San Joaquin Valley APCD	Rule 4409 - Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities	Quarterly
San Luis Obispo County APCD	Rule 417 - Control of Fugitive Emissions of VOCs	Quarterly
Santa Barbara County APCD	Rule 331 - Fugitive Emissions Inspection and Maintenance	Quarterly
Shasta County AQMD**	NA	
Siskiyou County APCD	NA	
South Coast AQMD	Rule 1173 - VOC Leaks and Releases from Components at Petroleum Facilities and Chemical Plants	Quarterly
Tehama County APCD	NA	
Tuolumne County APCD	NA	
Ventura County APCD	Rule 74.10 - Components at Crude Oil and Natural Gas Production and Processing Facilities	Quarterly
Yolo-Solano AQMD	Rule 2.23 - Fugitive Hydrocarbon Emissions	Quarterly

NA= Not applicable, no existing LDAR program
* Applicable only to petroleum refineries and chemical plants
** Indicates districts that do not have oil and gas production facilities but do have transmission compressors
*** Applicable only to components at pipeline transfer stations

Table 4-2
Estimated Number of Additional Components to be Inspected under the Proposed LDAR Requirements

Air District	Number of additional oil and gas components to be inspected
Bay Area	13,450
Butte	1,293
Colusa	30,219
Feather River	58,249
Glenn County	44,665
Monterey Bay Unified	11
North Coast Unified	127
Santa Barbara County	49,710
South Coast	7,171
San Joaquin	750,342
Sacramento Metropolitan	17,935
Tehama County	9,606
Ventura County	297
Yolo Solano	60,465

The vapor collection and control requirements of the Proposed Regulation may result in collected vapors being stored temporarily at the collection site and then transferred via truck for disposal in a sales gas system, microturbines, fuel gas system, or existing gas disposal wells. This is similar to operations at some facilities for produced water, where produced water is stored in tanks near the production well and then transported via truck to a waste water injection well. Temporary storage of vapors may require additional tanks and compressors and, therefore, ARB does not expect regulated entities to utilize this option. However, if employed, these truck trips would be local in nature and are not anticipated to affect air quality to an extent greater than under the existing operations at any particular oil and gas facility.

It is probable that transport of light equipment and personnel for implementation of the Proposed Regulation would take place using light duty trucks, while transport of heavy equipment or bulk materials would be hauled in heavy-duty trucks. ARB implements several regulations with the purpose of reducing emissions of NOx and PM, and imposing limits on idling, from in-use heavy-duty trucks and equipment - the On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation, the Regulation for In-Use Off-Road Diesel Fueled Fleets, the Portable Engine Airborne Toxic Control Measure, and the Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling. Much of the equipment used for implementation of the Proposed Regulation would be subject to these regulations. Overall, vehicle emissions generated from

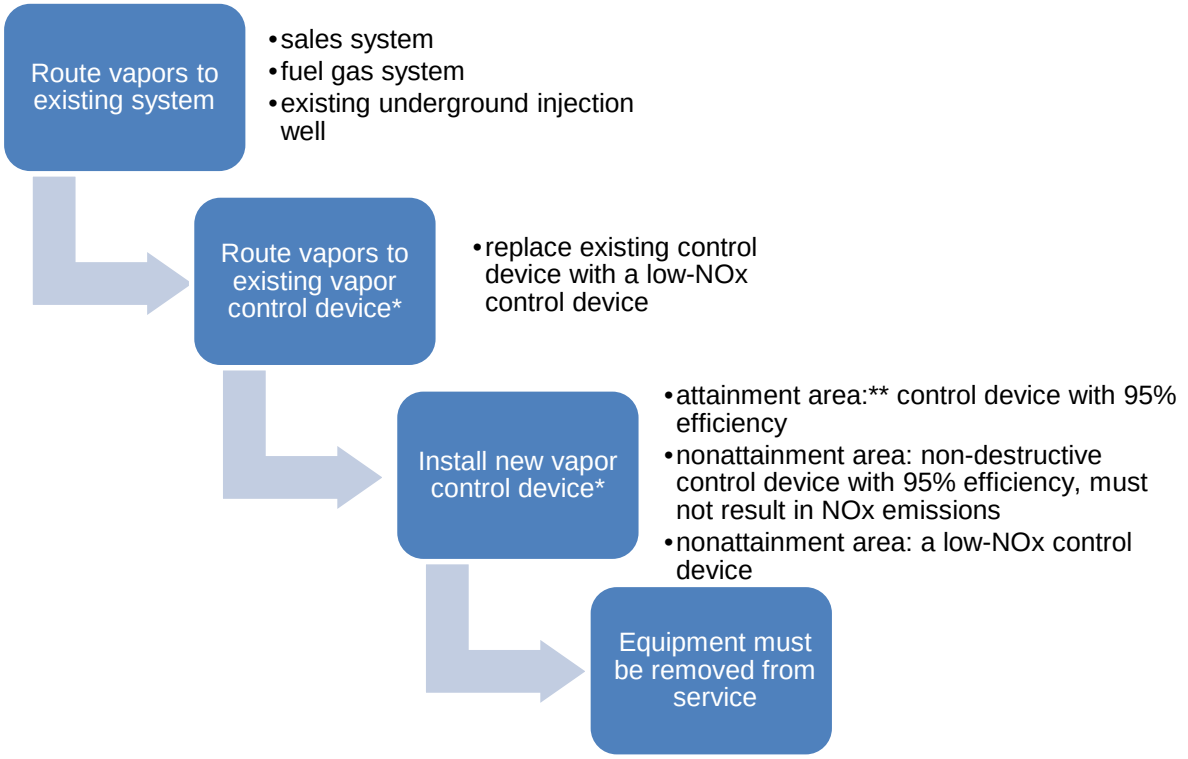
additional vehicle miles would have a less-than-significant impact to air quality. Calculations substantiating this conclusion are described in section c) below.

b) Vapor Collection and Control

As described in Chapter 2.D, the Proposed Regulation requires regulated entities to capture vented and fugitive methane emissions from various types of equipment such as separators, tanks, pressure vessels, sumps, pneumatic devices and pumps, and compressors if emission rates exceed the thresholds established in the Proposed Regulation. The Proposed Regulation imposes a tiered approach for disposal of the collected vapors, as shown in Figure 4-1. Regulated entities must demonstrate that compliance with a tier is unavailable at the facility prior to moving to the subsequent tier; for example, the regulated party must first attempt to comply by routing vapors to an existing natural gas system prior to routing to a vapor control device. In the near term, routing the captured vapors to a vapor control device will result in combustion of those vapors as non-combustion devices are not currently available for this application, although they are permitted to be used, and ARB anticipates that they will be used in the future. Methane destruction via combustion (e.g., oxidation, flaring) can cause an increase in emissions of sulfur oxide (SOx), NOx, PM, CO, and water vapor. However, the design of the Proposed Regulation, as discussed below, not only avoids any substantial increases in these pollutants – it decreases emissions of NOx below existing levels in the San Joaquin Valley. Further, emissions of VOCs and some TACs (including the benzene, toluene, ethylbenzene, and xylene [or BTEX] suite of chemicals) could also be reduced as a result of their combustion along with the methane.

Disposal of vapors by routing to an existing sales or fuel gas system or gas disposal well is the preferred method of compliance with the Proposed Regulation. Combustion and partial combustion of these vapors used as on-site fuel may create secondary pollutants including SOx, NOx, PM, CO, CO_2, and smoke/particulates. However, the use of recovered vapors for on-site equipment fueling would lessen the amount of conventional fuels that would be combusted on-site and the need to transport those fuels to the site. Consequently, any pollutants resulting from use of recovered vapors for on-site fueling would not represent an increase above baseline- i.e., those pollutants would have been entitled as a result of fuel use even without the Proposed Regulation. These disposal methods may not be feasible in all instances, in these situations, the Proposed Regulation provides additional compliance options.

Figure 4-1: Requirements for Disposal of Collected Vapors in the Proposed Regulation



* The device must meet all applicable federal, state, and local air district requirements.
**Must be in attainment for all state and federal ambient air quality standards.

The second option requires that regulated entities operating an existing vapor control device route newly collected vapors into the existing vapor collection system and then replace the existing vapor control device that would receive increased vapor throughput with a non-destructive (e.g., non-combustion) or low-NOx[13] vapor control device. This compliance response results in an incremental increase in throughput in the existing system. However, because the throughput (current operations plus additional vapors collected for compliance with the Proposed Regulation) would be combusted in a vapor control device that meets more stringent standards than the existing vapor control device (i.e., a conventional flare), ARB estimates an overall reduction in NOx emissions. In addition to the NOx benefits associated with replacing a conventional flare with a low-NOx vapor control device, this compliance option would likely result in the installation of a device that achieves a higher vapor control efficiency than the device being replaced. Use of a high efficiency device results in a more complete combustion of the vapors which reduces the creation of NOx, SO_2, CO and PM 2.5 emissions and provides greater VOC destruction from a standard flare; although ultimately the creation

[13] A device that achieves 95 percent vapor control efficiency and does not generate more than 15 parts per million volume NOx when measured at 3% oxygen.

of NOx, SO_2, and $PM_{2.5}$ are influenced by the fuel characteristics and oxygen distribution in the combustion zone. Even with the additional combustion, the Proposed Regulation ensures that emissions of criteria pollutants remain below levels of significance in nonattainment areas.

For facilities without existing vapor control devices, a new vapor control device may be installed with different requirements for attainment and nonattainment areas. Regulated entities located in areas designated as in attainment with all state and federal ambient air quality standards could comply with the Proposed Regulation with the installation of a local air district approved vapor control device (i.e., flare) that achieves at least a 95 percent vapor control efficiency. ARB does not anticipate that any facilities in attainment areas would need to install a new vapor control device to comply with the Proposed Regulation. Regulated entities in areas designated as nonattainment with state and federal ambient air quality standards could comply with the Proposed Regulation with the local air district approved installation of a non-destructive (e.g., non-combustion) or a low-NOx vapor control device.

The installation of any new vapor control device or replacement of an existing vapor control device must comply with all applicable federal, State, and local air district requirements. These devices are permitted through local air districts in compliance with New Source Review (NSR) (applies to stationary sources of designated nonattainment pollutants) requirements under the Clean Air Act, or local rules to control emissions from flares, or both. For example, there are two rules implemented by San Joaquin Valley Air Quality Management District (SJVAPCD) addressing flares: 1) Rule 4311 that seeks to improve flaring practices from stationary sources that have the potential to emit more than 10 tons per year of NOx and 2) Rule 2201 which implements NSR permitting. The standards established under these rules contribute to SJVAPCD nonattainment compliance plans. In addition, installation of any flares would be subject to the requirements of any existing or future district flare minimization plans.

If none of the previously discussed options is feasible, then the Proposed Regulation requires the existing equipment be removed from service. While there may be some short-term construction related impacts resulting from the equipment removal, they would be minimal, local in nature and occur over a short duration. Removing equipment from service would result in a long-term operational methane and VOC reduction benefit; however, ARB expects that most, if not all, regulated entities would be able to comply without removing the equipment from service.

c) Emission Impacts

ARB has calculated estimated emission impacts and emission reductions of the Proposed Regulation for criteria air pollutants and various toxic air contaminants. As discussed previously, the primary emission impacts of the Proposed Regulation occur through vehicle emissions due to increased LDAR and combustion of additional vapors collected and routed to vapor control devices.

To estimate vehicle emissions, ARB estimated the travel time that would be associated with LDAR for the additional components in each of the air districts identified in Table 4-2. ARB estimated that every 262.5 components would require 1 hour of travel time. This estimate is based on data collected from districts and LDAR contractors for the economic analysis of the Proposed Regulation. ARB assumed that vehicles could travel 33 miles for every travel hour. ARB believes this a conservative estimate as travel time would occur primarily within oil and gas fields where vehicle speed may be restricted, but would also capture travel time outside oil and gas facilities with higher allowable vehicle speeds. ARB obtained gram per mile, running exhaust emission rates for diesel and gasoline light-heavy-duty trucks from ARB's mobile source emission inventory, EMFAC2014[14] for reactive organic gases (ROG), total organic gases (TOG), CO, NOx, CO_2, PM10, PM2.5, and SOx. Additionally, ARB included PM10 and PM2.5 emissions associated with tire wear and brake wear. A detailed description of this analysis is included in Attachment 3.

To determine the emission impacts from combustion of additional vapors collected and routed to vapor control devices, staff used data from the 2009 Oil and Gas Industry Survey[15,16] (2009 Survey) to get a count of systems by district. A system consists of a separator and its subsequent crude and water tanks (ARB 2009). ARB used the separator counts in the 2009 Survey to inform the number of systems by facility per district that would be subject to the Proposed Regulation (i.e., those systems found to be uncontrolled with methane emissions exceeding 10 metric tons per year) and did not have access to an existing sales gas system, existing fuel gas system, or existing gas disposal well. ARB's analysis identified such facilities in the boundary of the San Joaquin Valley Air Pollution Control District (SJVAPCD) that met these criteria, but did not identify such facilities in any other air district. Therefore, all combustion related emissions from vapor control are assumed to occur within SJVAPCD. ARB used Western States Petroleum Association and ARB crude and water tank flash data to determine emission factors in metric tons per barrel for methane, volatile organic compounds (VOC), and the BTEX suite of chemicals. Additional emission factors for the low-NOx flare for CO, NOx and SOx were obtained from Aeron, a manufacturer of low-NOx vapor control devices. ARB developed PM10 and PM2.5 emission factors for the low-NOx flare based on the Total PM emission factor from actual test data provided by Aeron and the ratio of PM10 to PM2.5 from the existing flare emission factors. The emission factors were applied to the system throughputs of crude, water, and dry gas, giving total emissions per system. A detailed description of this analysis is found in Appendix D of the ISOR and is herein incorporated by reference.

[14] EMFAC2014 web database is available at: http://www.arb.ca.gov/emfac/

[15] The 2009 Oil and Gas Industry Survey is available at: http://www.arb.ca.gov/cc/oil-gas/industry-survey.htm

[16] The 2009 Survey is the most comprehensive dataset that exists for California's oil and gas industry. No other dataset, federal or statewide, contains as much detailed information about the industry in the state. ARB has incorporated additional or supplemental data where appropriate.

Additional analysis was required for systems subject to the Proposed Regulation that are at facilities where existing vapor control devices are in operation. For these systems, to ensure the analysis reveals all potential impacts, ARB assumed that the additional throughput would be directed to the smallest vapor control device at the facility and that the existing vapor control device would be replaced with a low-NOx control device. ARB then calculated the emissions from the existing vapor control device with current throughput. Emission factors for the existing vapor control devices were obtained from U.S. EPA's AP-42, Compilation of Air Pollutant Emission Factors[17]. ARB calculated emissions from the low-NOx vapor control device with the current throughput plus the additional throughput resulting from the Proposed Regulation. The emission totals from the existing vapor control device were subtracted from the emission totals of the low-NOx vapor control device to determine the net emissions.

ARB's analysis identified negligible emission impacts of less than 0.1 tons per year for ROG, TOG, CO, NOx, PM10, PM2.5, and SOx for all air districts except for SJVAPCD. ARB considers these emission impacts as negligible since the analysis contains too much uncertainty to accurately quantify such small increases. For SJVAPCD, ARB estimates noteworthy reductions of 0.5 tons per year of NOx and 30.1 tons per year of CO, and negligible reductions in SOx. Conversely, ARB has identified emission increases of 0.9 tons per year of PM10 and 0.3 tons per year of PM 2.5 in the SJVAPCD. When emission impacts are evaluated at the air basin level, ARB has identified emission increases of 0.3 tons per year of CO and 0.4 tons per year of NOx in the Sacramento Valley Air Basin. Emission impacts for all other air basins are negligible, other than the San Joaquin Valley where impacts are the same as reported for the SJVAPCD. Nonetheless, all emission impacts are well below any applicable CEQA significance thresholds for direct and cumulative impacts. It is therefore appropriate to conclude that air quality impacts are less than significant. The CEQA significance thresholds for the air districts, and air basins, where ARB has identified potential emission impacts can be found in Table 5 in Attachment 1.

As previously stated, ARB's analysis shows a net NOx decrease of 0.5 tons per year and net increases of PM10 and PM2.5 of 0.9 and 0.3 tons per year, respectively, in the SJVAPCD. ARB's analysis uses the current baseline (i.e., emissions from current vapor control devices). The SJVAPCD has published a study of the potential to reduce NOx from existing flaring, as required by a commitment in the 2015 State Implementation Plan (SIP) for the 1997 PM2.5 Standard. In an update to the SJVAPCD Governing Board (SJVAPCD 2016), district staff state that the low-NOx vapor control devices, as required under the Proposed Regulation, will be required under the district's upcoming SIP therefore ARB must not "take credit" for NOx reductions from these devices.

[17] AP-42, Compilation of Air Pollutant Emission Factors, has been published since 1972 as the primary compilation of EPA's emission factor information. It contains emission factors and process information for more than 200 air pollution source categories. AP-42 is available at: http://www3.epa.gov/ttnchie1/ap42/

ARB staff disagree that undeveloped future rules are properly considered part of the CEQA baseline. Pursuant to CEQA, the baseline to be used in an environmental analysis is the physical environmental conditions as they exist at the time environmental review is commenced. However, in an effort to fully address SJVAPCD's concerns, ARB has conducted a further analysis against a hypothetical future baseline where all existing vapor control devices are already low-NOx vapor control devices. In such a scenario, there would be no NOx benefit attributed to the Proposed Regulation for replacing current vapor control devices with low-NOx vapor control devices. Under that scenario, the Proposed Regulation would result in a NOx emissions increase in the SJVAPCD of 4.1 tons per year, CO emissions increases of 1.6 tons per year, and a negligible SOx emissions increase. PM10 and PM2.5 emissions would not change. All estimated emissions increases under this alternative scenario are below the CEQA significance threshold for the SJVAPCD of 10 tons per year for NOx, 5 tons per year for PM10, and 15 tons per year for PM 2.5. The SJVAPCD does not define CEQA significance thresholds for CO and SOx. However, as noted above, the proper CEQA baseline for this project is existing environmental conditions, as analyzed above.

The change in NOx emissions that might occur as a result of the proposed regulation was estimated separately by staff of the SJVAPCD. The SJVAPCD analysis was limited to emissions from tanks only. For context, when comparing against this hypothetical future baseline, ARB staff estimates an additional 2.9 tpy NOx from the tank measure only. SJVAPCD staff estimates an additional 20.2 tpy NOx, an order of magnitude greater than the ARB staff estimates.

ARB staff believes these high estimates are not accurate for several reasons. Emissions estimates were calculated by ARB and SJVAPCD staff using the same general method, but the assumptions and data applied to the calculations differed significantly. SJVAPCD staff assumed that all tank systems are currently uncontrolled except for those owned by the three largest operators. In contrast, ARB staff used the robust data contained within the oil and gas survey results to determine that 18% of tank systems are currently uncontrolled. The survey results are comprehensive and companies provided information on control status and disposal method. In addition, SJVAPCD staff assumed all captured gas would require an equal amount of supplemental make-up gas before combustion in a flare would be possible. In fact, low-NOx incinerators can handle waste gas and likely would not require additional make-up gas. Indeed, in the final version of the regulation, ARB has disallowed the use of supplemental fuel. SJVAPCD staff also assumed that all additional gas collected as a result of the proposed regulation would be routed to a flare, whereas ARB survey data reveals that only four percent of all tank systems currently have vapor recovery flares and the vast majority of tank systems use other vapor control methods. Flash test data were used by both sets of staff to determine what systems would be above the 10 MT standard. The flash test data used in the SJVAPCD staff analysis is an order of magnitude greater than the data used in the ARB staff analysis. ARB staff used recently

reported flash test data, gathered according to a recent version of ARB's test procedure. Finally, the standard is for each tank system not for the facility as a whole. ARB was able to estimate the number of tank systems using the survey data whereas SJVAPCD staff assumed that all gas produced on the lease would go into one large tank system. This is not the case and would overestimate the impact. ARB staff employed the most comprehensive and detailed data and information available, collected directly from oil and gas operators in California, to estimate NOx emissions that might result from the proposed regulation, and disagrees with the conclusion of the analysis presented by SJVAPCD staff.

ARB estimates that the controls and associated compliance responses from the Proposed Regulation will also provide substantial reductions of several toxic air contaminants and criteria air pollutants. Table 4-3 displays the estimated statewide emission reductions from hydrocarbons, VOC's, the BTEX suite of chemicals, and NOx.

A detailed description of how ARB calculated these emission benefits can be found in Appendix B and Appendix D of the Staff Report. Generally, the emissions were calculated from a combination of emission factors, survey data, and other data provided by stakeholders. There are two primary methods used to determine emissions based on the available data. The first method involves converting a volume of gas into mass. This method was used for calculating emissions from reciprocating compressors and centrifugal compressors. Combining this method with the appropriate conversion factors yields a mass of pollutant from cubic feet of gas. The second method uses an emission factor. Emission factors express emissions in either the mass of pollutant emitted per equipment device or per unit of time. This method was used for calculating emissions for the LDAR, tank and separator systems, and pneumatic devices segments. To calculate these emissions, the emission factor was multiplied by the number of devices and the usage per year.

Table 4-3.
Estimated Statewide Emission Reductions of Toxic Air Contaminants and Criteria Air Pollutants (tons/year)

Category	Total Hydrocarbons	VOCs	Benzene	Toluene	Ethyl-Benzene	Xylenes	NOx
Vapor collection on uncontrolled oil and water separators, tanks, and sumps with emissions above a set methane standard[1]	10,458	1,362	23	11	1.7	8.5	1.6
Control of vapors from uncontrolled well stimulation circulation tanks	96	12	0.2	0.1	<0.1	<0.1	<0.1
Leak Detection and Repair (LDAR) on components, such as valves, flanges, and connectors currently not covered by local air district rules	9,698	1,264	22	10	1.5	7.9	(1.6)[2]
Inspection and repair requirements for reciprocating natural gas compressors	1,318	172	3.0	1.4	0.21	1.1	NA
Vapor collection of centrifugal compressor wet seal vent gas, or replacement of higher emitting “wet seals” with lower emitting “dry seals”	68	9	0.2	<0.1	<0.1	<0.1	NA
Replacement of pneumatic pumps, and replacement or retrofitting of pneumatic devices under certain circumstances	6,199	808	14	6.5	1.0	5.0	NA
TOTAL (benefits from proposed regulation)	27,837	3,627	62	29	4.6	23	(<0.1)

[1] All estimated emission reductions from this category are occurring in the San Joaquin Valley Air Basin.
[2] ARB estimates that increased LDAR will result in increased NOx from vehicle emissions by 1.6 tons/year.

The design of the Proposed Regulation, as discussed above, limits increases in PM to below significance levels in SJV and avoids any substantial increases in these criteria pollutants from combustion related activities in other districts. The Proposed Regulation decreases NOx emissions below existing levels in the San Joaquin Valley. Additionally, the Proposed Regulation provides substantial emission benefits of hydrocarbons and VOCs as well as smaller benefits of the BTEX suite of chemicals. ARB estimates that

where the Proposed Regulation would result in net emissions increases, those increases would be either negligible or non-negligible increases which are not anticipated to affect regional air quality to an extent substantially greater than under the existing operations at any particular oil and gas facility. Thus, the Proposed Regulation would result in a **less-than-significant** impact on air quality.

4. Biological Resources

Impact 4.a: Short-term Construction-Related Impacts on Biological Resources

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Construction activities related to these compliance responses could cause temporary direct and indirect adverse impacts to special status species and habitats (e.g., San Joaquin kit fox). Because the reasonably foreseeable compliance responses would generally be minimal and above-ground, the potential for adverse construction-related effects on biological resources would be limited to installation of piping and temporary staging areas associated with facility modifications. Direct mortality could result from destruction of dens, burrows, or nests through ground compaction, ground disturbance, debris, or vegetation removal within oil and gas facility sites. Indirect impacts to animals could result from noise disturbance that might cause nest or den abandonment and loss of reproductive or foraging potential around the site during construction, transportation, or destruction of equipment.

In general, oil and gas facilities exist on sites that are, or have been, subjected to severe disturbance including grading, trenching, paving, and construction of roads and structures. Daily activities often include the presence of humans, movement of automobiles, trucks and heavy equipment, and operation of stationary equipment. In general, oil and gas facilities are not considered conducive to many biological resources. Vegetation is often removed or controlled and wildlife displaced to more suitable surroundings. Additionally, modifications associated with the Proposed Regulation would occur within the well facility boundaries, which are highly disturbed and not likely to be supportive of biological species.

Nonetheless, there are plant and animal species that occur, or even thrive, in developed settings. Also, activities that require disturbance of undeveloped areas, such as the construction of new structures, roads or paving have the potential to adversely affect plant or animal species that may reside in those areas. Because of the possible

presence of special status species or habitat that might be directly or indirectly adversely impacted by project implementation, compliance responses could result in potentially significant impacts to biological resources. Depending on the status of the species and the nature of the habitat disturbance, compliance with permitting requirements under the National Environmental Policy Act (NEPA), the federal Endangered Species Act, Migratory Bird Treaty Act, Clean Water Act, Section 404, or related state or local laws would be required. Accordingly, the potential impact to special-status species and sensitive habitats would be minimized. However, the possibility cannot be ruled out that a special-status species or its habitat could be adversely affected, even with applicable regulations in place, recognizing the potential changes in habitat expected from Proposed Regulation compliance responses under some circumstances.

Short-term construction-related impacts to biological resources would be potentially significant.

The impacts to biological resources could be reduced to a less-than-significant level by mitigation that can and should be implemented by federal, state, and local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 4.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of biological resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to biological resources include:

- Proponents of construction activities implemented as a result of reasonably foreseeable compliance responses associated with the Proposed Regulation would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.
- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant impacts on biological resources associated with the project.

- Actions required to mitigate potentially significant biological impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.
    - Retain a qualified biologist to prepare a biological inventory of site resources prior to ground disturbance or construction. If protected species or their habitats are present, comply with applicable federal and State endangered species acts and regulations. Construction and operational planning would require that important fish or wildlife movement corridors or nursery sites are not impeded by project activities.
    - Retain a qualified biologist to prepare a wetland survey of onsite resources. This survey shall be used to establish setbacks and prohibit disturbance of riparian habitats, streams, intermittent and ephemeral drainages, and other wetlands. Wetland delineation is required by Section 404 of the Clean Water Act and is administered by the U.S. Army Corps of Engineers.
    - Prohibit construction activities during the rainy season with requirements for seasonal weatherization and implementation of erosion prevention practices.
    - Prohibit construction activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring, as needed, to address project activities that could cause an active nest to fail.
    - Prepare site design and development plans that avoid or minimize disturbance of habitat and wildlife resources, and prevent stormwater discharge that could contribute to sedimentation and degradation of local waterways. Depending on disturbance size and location, a National Pollution Discharge Elimination System (NPDES) construction permit may be required from the California State Water Resources Control Board.
    - Prepare spill prevention and emergency response plans, and hazardous waste disposal plans as appropriate to protect against the inadvertent release of potentially toxic materials.
    - Plant replacement trees and establish permanent protection suitable habitat at ratios considered acceptable to comply with “no net loss” requirements.
    - Contractor will keep the site and materials organized and store them in a way to prevent attracting wildlife by not creating places for wildlife to hide or nest (e.g., capping pipes, covering trashcans and emptying trash receptacles consistently and promptly when full).

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this Draft EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts to biological resources associated with the Proposed Regulation would be **potentially significant and unavoidable**.

Impact 4.b: Long-term Operational Impacts on Biological Resources

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Operational activities associated with implementation of the Proposed Regulation would include monitoring (e.g., inspections, repairs) and reporting activities, and collection and disposal of vapors. These activities would not be anticipated to affect biological resources to an extent substantially greater than under the existing operations at any particular oil and gas facility. Thus, long-term operational impacts on biological resources would be **less-than-significant**.

5. Cultural Resources

Cultural resource impacts are inherently construction-related, since they may result from ground disturbance. Therefore, the long-term implementation of the Proposed Regulation would not adversely affect cultural resources.

Impact 5.a: Short-Term Construction-Related Impacts on Cultural Resources and Paleontological Resources

In general, oil and gas facilities have already been substantially disturbed. Regardless, they may be located in a region where significant prehistoric and historic-era cultural resources have been recorded and there remains a potential that undocumented cultural resources could be unearthed or otherwise discovered during ground-disturbing and construction activities. Prehistoric or ethnohistoric materials might include flaked stone tools, tool-making debris, stone milling tools, shell or bone items, and fire-affected rock or soil darkened by cultural activities (midden); examples of significant discoveries would include villages and cemeteries. Historic materials might include metal, glass, or ceramic artifacts; examples of significant discoveries might include former privies or refuse pits. In some cases, oil and gas facilities are located near or within tribal lands.

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor recovery systems, installation of ambient air or leak detection monitors, installation of low-bleed or zero-bleed pneumatic devices, and replacement of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices tanks, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities. While the majority of these activities would not require earth-moving activities that could affect cultural resources, some trenching may be necessary to install piping. Limited grading may also take place to allow for installation of new equipment and infrastructure. The potential for accidental discovery of cultural resources is limited to activities that would bring oil and gas facilities in compliance with the Proposed Regulation. Construction and operation of new oil and gas facilities are not a requirement of or incentivized by the Proposed Regulation; thus construction of new facilities that could affect tribal resources or other land uses are not associated with the Proposed Regulation.

Short-term construction-related impacts to cultural resources would be potentially significant.

The impacts to cultural resources could be reduced to a less-than-significant level by mitigation that can and should be implemented by federal, state, and local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 5.a: Conduct Surveys, Consult with Agencies and Native American Tribes, and Prepare and Implement Formal Recommendations Related to Cultural or Paleontological Resources

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of cultural resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to cultural resources include:

- Proponents of construction activities implemented as a result of reasonably foreseeable compliance responses associated with the Proposed Regulation would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review

requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant impacts on cultural resources associated with the project.
- Actions required to mitigate potentially significant cultural impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.
    - Retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61.
    - Seek guidance from the State and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes.
    - Provide notice to Native American Tribes of project details to identify potential Tribal Cultural Resources (TCRs). In the case that a TRC is identified, prepare mitigation measures that:
        - Avoid and preserve the resource in place,
        - Treat the resource with culturally appropriate dignity,
        - Employ permanent conservation easements, and
        - Protect the resource.
    - Seek guidance from the State Historic Preservation Officer and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American tribes.
    - Regulated entities shall consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies shall provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes.
    - If a resource determined to be significant by the qualified archaeologist (i.e., because the find is determined to constitute either an historical resource or a unique archaeological resource), the archaeologist shall work with the project applicant to avoid disturbance to the resources, and if completed avoidance is not possible, follow accepted professional standards in recording any find. Preservation in place is the preferred manner of mitigating impacts to archaeological sites.

- Regulated entities shall define the area of potential effect (APE) for each project, which is the area where project construction and operation may directly or indirectly cause alterations in the character or use of historic properties. The APE shall include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access.
- Regulated entities shall retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures, Society of Vertebrate Paleontology, 1995 http://www.vertpaleo.org/society/polstateconfomimpactmigig.cfm.
- Regulated entities shall conduct initial scoping assessments to determine whether proposed construction activities, if any, could disturb formations that may contain important paleontological resources. Whenever possible potential impacts to paleontological resources should be avoided by moving the site of construction or removing or reducing the need for surface disturbance. The scoping assessment shall be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements.
- The regulated entity's qualified paleontological resources specialist shall determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossiliferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses the following steps:
    - A preliminary survey (if not conducted earlier) and surface salvage prior to construction;
    - Physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries;
    - Monitoring and salvage during excavation;
    - Specimen preparation;
    - Identification, cataloging, curation and storage;
    - A final report of the findings and their significance; and

- Choose sites that avoid areas of special scientific value.

Because ARB is not responsible for implementation of project-specific mitigation and the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce potentially significant impacts. Consequently, the Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts on cultural resources may be **potentially significant and unavoidable**.

6. Energy Demand

Impact 6.a: Short-Term Construction-Related Impacts on Energy Demand

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities. These compliance responses would result in temporary increases in energy demand associated with the transport of necessary equipment, trenching for piping, and installation of new features.

However, activities associated with implementation of the Proposed Regulation would be similar to maintenance activities already required to maintain oil and gas facilities, that is, temporary and limited in magnitude. Thus, the temporary increase in demand would not be considered inefficient, wasteful, or unnecessary. Thus, short-term construction-related impacts on energy demand would be **less-than-significant**.

Impact 6.b: Long-Term Operational Impacts on Energy Demand

Implementation of the Proposed Regulation would result in requirements for monitoring (e.g., inspections, repairs) and reporting, as well as collection and disposal of methane vapors associated with oil and gas facilities. Various methods could be used to comply with the Proposed Regulation, as described in Section 2, Project Description. While collection of vapors would generally rely upon the pressure associated with gas to transport, some options for disposal could require changes to energy demand. For instance, pumping gas into a gas disposal well would increase energy needs, while routing methane to fuel or sales lines could reduce energy demands by diverting methane to productive use that would have otherwise been vented to the atmosphere. The potential for a change in energy demand would be site-specific and dependent on the particular methods used to comply with the Proposed Regulation.

The Proposed Regulation would also result in an expansion in the number of facilities covered by LDAR programs and may result in more frequent inspections at facilities for the additional methane components only. In many cases, these requirements could be coordinated with existing monitoring requirements for VOCs and other emissions; however, in some areas of the state existing monitoring requirements do not exist. In these areas, the Proposed Regulation would require the regulated entities to establish new LDAR programs. Increased inspections, equipment repairs, and replacements would increase vehicle mileage which could potentially result in an increase in fuel consumption. However, the additional mileage would be minimal and infrequent (e.g., quarterly) and would not amount to a substantial increase in fuel consumption. In addition, many local air districts currently use fuel efficient vehicles (e.g., hybrid vehicles) to conduct inspections and it is likely that even more fuel efficient vehicles (i.e., plug-in hybrid, zero emission vehicles) would be used in the future.

The vapor collection and control requirements of the Proposed Regulation may result in collected vapors being stored temporarily at the collection site and then transferred via truck for disposal in the sales gas system, microturbines, fuel gas system or gas disposal wells. The potential for an increase in fuel consumption would be site-specific and dependent on the particular methods used to comply with the Proposed Regulation. However, any increases in energy consumption would be minimal and not substantial in comparison to the demand associated with an oil and gas facility. Furthermore, in the case that vapor disposal methods use microturbines or other productive use of captured vapor, energy demand could be decreased as these systems produce electricity that could offset energy needs associated with facilities. Thus, long-term operational impacts on energy demand would be **less-than-significant**.

7. Geology and Soils

Impact 7.a: Short-Term Construction-Related Impacts on Geology and Soils

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Although it is reasonably foreseeable that construction and operational activities could occur, there is uncertainty as to the exact location where actions to comply with the Proposed Regulation may be located. Construction activities resulting from the Proposed Regulation could require disturbance of undeveloped areas on existing oil facilities, such as clearing of vegetation, earth movement and grading, and trenching for

piping installation. In general, the potential to result in these types of disturbances would be associated with trenching for new piping or preparation for construction staging areas.

Underground piping alignments and staging areas could be located in a variety of geologic, soil, and slope conditions with varying amounts of vegetation that would be susceptible to soil compaction, soil erosion and loss of topsoil during construction. The level of susceptibility varies by location. However, the specific design details, siting locations, and soil compaction and erosion hazards for particular manufacturing facilities are not known at this time and would be analyzed on a site-specific basis at the project level.

Short-term construction-related impacts to geology and soil resources would be potentially significant.

The impacts to soil and geologic resources could be reduced to a less-than-significant level by mitigation that can and should be implemented by federal, state, and local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 7.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of geology and soils. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to geology and soils include:

- Proponents of construction activities implemented as a result of reasonably foreseeable compliance responses associated with the Proposed Regulation would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.
- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant impacts on geologic and soil resources associated with the project.

- Actions required to mitigate potentially significant geology and soil impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.
    - Prior to the issuance of any development permits, proponents of new or modified facilities or infrastructure would prepare a geotechnical investigation/study, which would include an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils including shrink-swell potential (expansion), soil resistivity, slope stability, mineral resources and the presence of hazardous materials.
    - Proponents of new or modified facilities or infrastructure would provide a complete site grading plan, and drainage, erosion, and sediment control plan with applications to applicable lead agencies. Proponents would avoid locating facilities on steep slopes, in alluvial fans and other areas prone to landslides or flash floods, or with gullies or washes, as much as possible.
    - Disturbed areas outside of the permanent construction footprint would be stabilized or restored using techniques such as soil loosening, topsoil replacement, revegetation, and surface protection (i.e. mulching).

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts to geology and soils would be **potentially significant and unavoidable**.

Impact 7.b: Long-Term Operational Impacts on Geology and Soils

Compliance responses associated with the Proposed Regulation could include the use of existing gas disposal wells to contain methane emissions that would otherwise be released into the atmosphere. These wells would exist with or without implementation of the Proposed Regulation; compliance would not result in the permitting or drilling of new gas disposal wells. These wells are subject to Class II permit requirements. Class II injection wells fall under DOGGR's Underground Injection Control (UIC) program, which is monitored and audited by the U.S. EPA. Obtaining a Class II permit requires various evaluations, such as engineering studies, geologic study, and injection plans. Requirements for these permits are likely to include: isopach maps, cross sections, and a representative electric log that identifies all geologic units, formations, freshwater aquifers, and oil or gas zones. Regulated entities would need to request modifications to permits, if new sources of wastewater would be injected.

Long-term geology and soils impacts are generally related to placing people or structures in areas that may pose risks, such as earthquakes, landslides, and soil erosion. Because construction projects associated with the Proposed Regulation would not involve new housing or substantial increases in population, impacts related to placing people or structures in areas that may pose geology and soils risks would not be anticipated.

Recent studies have indicated that increased earthquake activities are attributed to the use of injected wastewater in several locations, including within the states of Colorado, Texas, Arkansas, Oklahoma, and Ohio (USGS 2015). However, these events are relatively uncommon as recent surveys have found that out of 30,000 water disposal wells only 8 were associated with felt seismic events (Veil 2013). These types of earthquakes are considered to be influenced by human-induced seismicity, resulting from elevated fluid pore pressures that lower the frictional strengths of faults and fractures leading to seismic rupture. Waste water disposal wells commonly inject 100,000 barrels per month for years which results in larger pressure changes to the subsurface environment and provides greater potential to induce slip on nearby faults (Rubenstein 2015). Most induced earthquakes attributed to fluid injection were too small to be perceptible by humans; however, seismic events induced by fluid injection have on several occasions been felt at the ground surface, and in extremely rare cases have produced ground shaking large enough to cause damage. These larger events can occur when large volumes of water are injected over long time periods (months to years) into zones in or near potentially active earthquake sources. All of the U.S. cases of induced seismicity related to fluid injection were located within the continental interior, where tectonic deformation rates are very low. In California, naturally occurring earthquakes are very frequent and tectonic forces have widespread influence, making it generally infeasible to reliably differentiate induced events from natural events, and only one earthquake has definitively been attributed to induced seismicity (CCST 2015).

At this time, it is unknown how many facilities may choose to dispose of waste methane through a gas disposal well; however, ARB's 2009 Survey indicated that one facility in California injects collected methane into underground wells (ARB 2009). Implementation of the Proposed Regulation would be expected to increase the amount of injected gas at this facility by three percent, which is not a substantial increase. Thus, the Proposed Regulation would not substantially increase the potential for seismic activity associated with underground injection. Only existing gas disposal wells are allowed under the Proposed Regulation. In the case that an oil and gas facility would need to inject an additional volume of gas that exceeds the existing gas disposal well's permitted volume, the facility would be required to notify DOGGR and further DOGGR analysis and approval would be required (California Code of Regulations Section 1724.10). These requirements are rigorous and would maintain the existing performance and environmental standards for injection wells in California in a manner that would avoid significant environmental impacts, including induced seismicity. These requirements include an injection plan that contains a map showing all injection facilities; maximum anticipated injection pressure and volumes; monitoring system or method used to

ensure that injection fluid is confined to the intended zone or zones of injection; method of injection; corrosion protective measures; the source, analysis, and treatment of the injection fluid; and the location and depth of water-source wells to be used in conjunction with the project (see Section 1.C.1 for an overview of underground injection well regulations). Thus, while the current influence of injected wastewater on seismicity in California has not been scientifically defined and is undergoing research, a company choosing injection over other methods of disposal would be subject to the DOGGR permitting requirements, which would avoid significant adverse effects. Consequently, the Proposed Regulation would not substantially increase the risk of induced seismicity above existing conditions. Long-term operational impacts on geology and soils would be **less-than-significant**.

8. Greenhouse Gases

Impact 8.a: Short-Term Construction-Related Impacts on Greenhouse Gases

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

These compliance responses would result in temporary increases in greenhouse gas emissions associated with the transport of necessary equipment, trenching for piping, and installation of new features. However, a majority of local agencies (e.g., air pollution control districts) do not recommend or require the quantification of short-term construction-generated GHGs for typical construction projects because these only occur for a finite period of time (e.g., during periods of construction) that is typically much shorter than the operational phase. Furthermore, the types of upgrades and modifications to oil and gas facilities that could be required under the Proposed Regulation would be minimal, consisting of activities such as installation of piping, valves, and hatches. Thus, short-term construction-related GHG impacts would be **less-than-significant**, and would be more than offset by the substantial GHG reduction benefits created by the Proposed Regulation.

Impact 8.b: Long-Term Operational Impacts on Greenhouse Gases

The Proposed Regulation is designed to reduce methane emissions from specified oil and gas facilities within California. The Proposed Regulation would result in CO_2 emission increases (i.e., combustion of collected vapors); however, these emissions would be in lieu of the release of methane into the atmosphere, which has a substantially higher global warming potential (GWP) than CO_2. Implementation of the

Proposed Regulation would result in monitoring (e.g., inspections, repairs) and reporting, as well as collection and disposal of methane vapors associated with oil and gas facilities. Various methods could be used to comply with the Proposed Regulation, as described in Chapter 2, Project Description. Use of a destructive vapor control device (i.e. low-NOx combustion devices) for disposal of vapors would result in an increase in CO_2 emissions associated with the combustion of the collected vapors (including methane). The combustion of methane and the associated conversion to CO_2 results in a net reduction in GHG emissions and the associated climate change impacts would be beneficial. Furthermore, routing collected vapors to the fuel gas system for powering on-site equipment, in lieu of the conventional fuel, would result in a net reduction in GHG emissions as the transport of the conventional fuel would no longer be required.

Implementation of the Proposed Regulation would increase vehicle mileage and associated fuel consumption. The Proposed Regulation would include additional components and associated facilities subject to LDAR and LDAR for those additional components would be on a quarterly basis. In some cases, these requirements could be coordinated with existing monitoring requirements for VOCs and other emissions; however, in some areas of the state existing monitoring requirements do not exist. In these areas, the Proposed Regulation would require the regulated entities to establish new LDAR programs. The additional miles to and from the oil and gas facilities for inspections, repairs, or replacements, would not be substantial and would be infrequent (e.g., quarterly) in nature. As described in the Air Quality analysis, ARB estimated the vehicle emissions associated with the proposed increased LDAR and showed an increase in annual CO_2 emissions of 376 metric tons.

The vapor collection and control requirements of the Proposed Regulation may result in collected vapors being stored temporarily at the collection site and then transferred via truck for disposal in the existing sales gas system, microturbines, fuel gas system or gas disposal wells. This is similar to operations at some facilities for produced water, where produced water is stored in tanks near the production well and then transported via truck to a waste water injection well. Temporary storage of vapors may require additional tanks and compressors and, therefore, ARB does not expect regulated entities to utilize this option. However, if employed, these truck trips would be local in nature and would not be anticipated to result in GHG emissions substantially greater than under the existing operations at any particular oil and gas facility. Table 4-4 displays the estimated statewide GHG emission benefits from the Proposed Regulation. In addition to the benefits identified in Table 4-4, the Proposed Regulation would also provide a reduction in risk of large, catastrophic methane releases (similar to the events at Aliso Canyon) from the proposed enhanced monitoring natural gas underground storage facilities due to increased monitoring. Overall, implementation of the Proposed Regulation would result in a **beneficial** impact to GHG emissions.

Table 4-4: Estimated Statewide GHG Emission Reductions (MT CO_2e/year)[1]	
Category	**Reductions**
Vapor collection on uncontrolled oil and water separators, tanks, and sumps with emissions above a set methane standard	538,000
Control of vapors from uncontrolled well stimulation circulation tanks	5,000
Leak Detection and Repair (LDAR) on components, such as valves, flanges, and connectors currently not covered by local air district rules	590,000
Inspection and repair requirements for reciprocating natural gas compressors	68,000
Vapor collection of centrifugal compressor wet seal vent gas, or replacement of higher emitting "wet seals" with lower emitting "dry seals"	3,500
Replacement of pneumatic pumps, and replacement or retrofitting of pneumatic devices under certain circumstances	319,000
TOTAL from Proposed Regulation	1,523,500

[1] Using the 20-yr global warming potential, 72, from the IPCC's Fourth Assessment Report (AR4) for methane.

9. Hazards and Hazardous Materials

Impact 9.a: Short-Term Construction-Related Impacts on Hazards and Hazardous Materials

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Installation of piping, flanges, valves, and other pieces of equipment associated with the compliance responses could require the use of hazardous materials and hazardous

wastes. These would generally consist of fuels, solvents, and other materials typically used to maintain industrial equipment. The management of hazardous materials and hazardous wastes would require permits from applicable federal, state, and local regulating agencies. Specific applicable laws and regulations that would apply include (but are not limited to) the Hazardous Waste Program specified under Subtitle C of the Resource Conservation and Recovery Act (RCRA), the Toxic Substances Control Act (TSCA), the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the Hazardous Materials Transportation Act (HMTA), and other applicable laws and regulations. In addition, it is expected that an oil and gas facility would already have secured such approval pursuant to these regulations and that the implementation of the project would not substantially change the routine transport, storage, use, and disposition of such hazardous materials and resulting wastes. Thus, short-term construction-related impacts associated with hazards and hazardous materials would be **less-than-significant**.

Impact 9.b: Long-Term Operational Impacts on Hazards and Hazardous Materials

Methane is not classified by U.S. EPA as a hazardous material; however, it is classified as a hazardous material in California. While methane is not toxic below the lower explosive limit of five percent (50,000 parts per million [ppm]), it does act as a simple asphyxiate by displacing oxygen in the air at higher concentrations. Symptoms of oxygen deprivation (asphyxiation) occur if the available oxygen falls below 18 percent; methane displaces oxygen to 18 percent in air when present at 14 percent (140,000 ppm). Methane is extremely flammable and can explode at concentrations between five percent (lower explosive limit) and 15 percent (upper explosive limit). These concentrations are lower than concentrations at which asphyxiation risk is substantial. Because oil and gas facilities vent methane directly into the atmosphere, the opportunity to concentrate methane to levels that would expose workers to hazardous conditions does not exist.

Installation and repair of gathering lines and piping, flanges, valves, low-NOx combustion devices, pneumatic devices and pumps, and other pieces of equipment associated with the compliance responses could require the use of hazardous materials and hazardous wastes. These would generally consist of fuels, solvents, and other materials typically used to maintain industrial equipment. The management of hazardous materials and hazardous wastes would require permits from applicable federal, state, and local regulating agencies. Specific applicable laws and regulations that would apply include (but are not limited to) the Hazardous Waste Program specified under Subtitle C of the RCRA, TSCA, CERCLA, HMTA, and other applicable laws and regulations. In addition, it is expected that an oil and gas facility would already have secured such approval pursuant to these regulations and that the implementation of the project would not substantially change the routine transport, storage, use, and disposition of such hazardous materials and resulting wastes.

Implementation of the Proposed Regulation would not drive development of new oil and gas facilities, but would rather address equipment used within an existing site. Siting of specific oil and gas projects is subject to the local land use authority, and the Proposed Regulation would not affect the location of existing or future facilities. As a result, the Proposed Regulation would have no effect on a facility's proximity to schools, airports and airstrips, or on sites included on the Cortese List (Government Code Section 65962.5). Likewise, the Proposed Regulation would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

Under the Proposed Regulation, collected vapors may be injected into existing, permitted underground wells. These wells are subject to Class II permit requirements. Class II injection wells fall under DOGGR's Underground Injection Control (UIC) program, which is monitored and audited by the U.S. EPA (see Section 2.B for more information). Therefore, while the Proposed Regulation addresses conveyance of methane, which is a hazardous material, various regulations and permit requirements are in place that reduce the long-term operational impacts related to hazards and hazardous materials to a **less-than-significant** level.

10. Hydrology and Water Quality

Impact 10.a: Short-Term Construction-Related Impacts on Hydrology and Water Quality

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Of the reasonably foreseeable compliance responses associated with the Proposed Regulation, earth-moving activities that could affect hydrology and water quality would be limited to installation of gathering lines and piping to route collected vapors to an existing process operation, existing sales gas system, microturbines, existing fuel gas system, existing gas disposal wells, or existing vapor control devices. These activities would be limited to the boundary of an oil and gas facility, which would have already obtained grading permits, Stormwater Pollution Prevention Plans (SWPPPs), and other regulations as part of the initial construction of initial project development. However, the specific design details, siting locations, and conditions within a facility are not known at this time and would be analyzed on a site-specific basis at the project level.

Thus, short-term construction-related impacts to hydrology and water quality would be potentially significant.

Impacts to hydrology and water quality could be reduced to a less-than-significant level by mitigation that can and should be implemented by federal, State, and local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 10.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations regarding hydrology and water quality ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or mitigate hydrology and water quality-related impacts include the following:

- Proponents of construction activities implemented as a result of reasonably foreseeable compliance responses associated with the Proposed Regulation would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.
- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant impacts on hydrology and water quality associated with the project.
- Actions required to mitigate potentially significant hydrology and water quality impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.
    - Under the oversight of the local lead agency, prior to issuance of any construction permits, project proponent would prepare a stormwater drainage and flood control analysis and management plan. The plans would be prepared by a qualified professional and would summarize existing conditions and the effects of project improvements, and would include all appropriate calculations, a watershed map, changes in downstream flows and flood elevations, proposed on- and off-site improvements, features to protect downstream uses, and property and drainage easements to accommodate downstream flows from the site. Project drainage features would be designed

to protect existing downstream flow conditions that would result in new or increased severity of offsite flooding.

- Establish drainage performance criteria for off-site drainage, in consultation with county engineering staff, such that project-related drainage is consistent with applicable facility designs, discharge rates, erosion protection, and routing to drainage channels, which could be accomplished by, but is not limited to: (a) minimizing directly connected impervious areas; (b) maximizing permeability of the site; and, (c) stormwater quality controls such as infiltration, detention/retention, and/or biofilters; and basins, swales, and pipes in the system design.
- The project proponent would design and construct any facility additions needed to comply with this rule to provide appropriate flood protection such that operations are not adversely affected by flooding and inundation. These designs would be approved by the local or State land use agency. The project proponent would also consult with the appropriate flood control authority on the design of offsite stream crossings such that the minimum elevations are above the predicted surface-water elevation at the agency's designated design peak flows. Drainage and flood prevention features shall be inspected and maintained on a routine schedule specified in the facility plans, and as specified by the county authority.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts to hydrology and water quality associated with the Proposed Regulation would be **potentially significant and unavoidable**.

Impact 10.b: Long-Term Operational Impacts on Hydrology and Water Quality

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the operation of

a grid detection system or wellhead sensors at natural gas underground storage facilities.

In the case that an existing gas disposal well is used for methane disposal, which is classified as a hazardous material in California, it would be subject to DOGGR and U.S. EPA requirements for Class II wells. Class II wells may be used for disposal of brines and other fluids associated with the production of oil and natural gas or natural gas storage operations. When oil and gas are produced, brine is also brought to the surface. The brine is segregated from the oil and is then injected into the same underground formation or a similar formation. These wells protect drinking water resources by avoiding contamination to surface water, soils, and drinking water aquifers. Underground injection wells are regulated as part of the Safe Drinking Water Act, which requires the U.S. EPA to report waste disposal practices, and develop minimum federal requirements for injection practices that protect public health by preventing injection wells from contaminating underground sources of drinking water Monitoring of pressure and volume injected disposal wells is required annually.

In California, all Class II injection wells are regulated by DOGGR, under provisions of the state Public Resources Code and the federal Safe Drinking Water Act. Class II injection wells fall under DOGGR's UIC program, which is monitored and audited by the U.S. EPA. In 1983, DOGGR received U.S. EPA primary authority, primacy, to regulate Class II wells. The main features of the UIC program include permitting, inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, and public outreach.

After a well is drilled, steel pipe called casing is cemented in the hole. The average injection well is about 2,000 feet deep (DOGGR 2016). The casing and cement prevent fluids in different zones from mixing with each other or with injected fluids. The casing and cement are perforated opposite the injection zone. To provide an extra layer of protection, tubing is placed in the well to a point just above the perforations and a packer is used near the bottom of the tubing to seal it against the casing. The packer prevents water from entering the space between the tubing and casing when water is injected down the tubing. Several tests are run to make sure the well is operating properly and the injected fluids are confined to the intended injection zone.

An injection zone is usually sandstone, a rock porous and permeable enough to accept injected fluids. Rock beds chosen for injection zones are covered by impermeable beds, like shale, that act as cap rocks, confining injected liquids in the porous beds. All Class II injection wells are monitored by DOGGR engineers to ensure the wells are operated properly and have mechanical integrity. Monitoring includes reviewing operational data and running tests, including the Mechanical Integrity Tests (i.e., spinner, temperature, and pressure tests and tracer surveys). In addition, most well sites are inspected annually by DOGGR engineers. Samples of the injected fluids may be taken at any time to confirm compliance.

Operators of Class II injection wells must file for a permit with DOGGR. Before a permit is issued, the proposed injection project is studied by DOGGR engineers and reviewed by the appropriate Regional Water Quality Control Board. DOGGR engineers evaluate the geologic and engineering information, solicit public comments, and hold a public hearing, if necessary. Injection project permits include many conditions, such as approved injection zones, allowable injection pressures, and testing requirements. As discussed under Section 1.C.1, permitting of a Class II well requires submission of a geologic study and injection plan that identifies all geologic units, formations, freshwater aquifers, and oil or gas zones. (Cal Code Regs., tit. 14, § 1724.7(b)). The injection plan must include a map showing all injection facilities; maximum anticipated injection pressure and volumes; monitoring system or method used to ensure that injection fluid is confined to the intended zone or zones of injection; method of injection; corrosion protective measures; the source, analysis, and treatment of the injection fluid; and the location and depth of water-source wells to be used in conjunction with the project. (Cal Code Regs., tit. 14, § 1724.7(c)). Class II permit requirements ensure that injection of hazardous materials would occur at a depth that would prevent surface contamination of soil and water, and minimize risks to the environment. See Section 1.C for additional information related to permitting and regulating Class II injection wells. Therefore, while compliance with the Proposed Regulation may result in disposal of methane in underground injection wells, there are various regulations and permit requirements in place that reduce the long-term operational effects to hydrology and water quality.

Implementation of the Proposed Regulation could result in closures of sump if operators are unable to control methane emission levels. SRWCB and BLM regulate the use and abandonment of sumps (i.e., lined surface impoundments). Under State regulations, sump operators must conduct a site hydrogeologic characterization, install a groundwater monitoring system, and construct and enclose the surface impoundment in accordance with specified criteria. Abandonment of unlined sumps includes removal and disposal of all free liquids, analysis of sludges and soils beneath the sumps, removal of contaminated sludges and soils, analysis of soils after removal of contaminated sludges and soils, backfilling of the sump, and revegetation of the site (Cal. Code Regs., tit 23, §§ 2510 – 2601). No adverse effects to water quality would be anticipated as a result of closure of a sump associated with implementation of the Proposed Regulation. Long-term operational impacts to hydrology and water quality would be **less-than-significant**.

11. Land Use and Planning

Impact 11: **Short-Term Construction-Related and Long-Term Operational Impacts on Land Use and Planning**

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of

gathering lines and piping, flanges, valves, low-NOx combustion devices, tanks, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Oil and gas facilities are often located in areas zoned for industrial uses; however, wells and equipment may also be located in residential areas or within the boundaries of incorporated cities (e.g., Long Beach, Los Angeles). The Proposed Regulation would not incentivize or otherwise increase the number of oil and gas facilities in California, but would regulate potential sources of vented and fugitive methane into the atmosphere through maintenance, inspection, and upgrade requirements. The Proposed Regulation would not conflict with applicable land use plans, policies, or regulations and it would not result in physical division of an established community. Thus, short-term construction-related and long-term operational impacts on land use and planning would be **less-than-significant**.

12. Mineral Resources

Impact 12: Short-Term Construction-Related and Long-Term Operational Impacts on Mineral Resources

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Oil and gas facilities are often located in areas zoned for industrial uses; however, wells and equipment may also be located in residential areas or within the boundaries of incorporated cities (e.g., Long Beach, Los Angeles). The Proposed Regulation would not incentivize or otherwise increase the number of oil and gas facilities in California, but would regulate potential sources of methane leaks into the atmosphere through maintenance, inspection, and upgrade requirements. Modifications to oil and gas facilities associated with the Proposed Regulation would be limited to covered (i.e., inaccessible to mining activities) or otherwise disturbed areas, and would not affect the availability of known mineral resource or recovery site. Thus, short-term construction-related and long-term operational impacts on mineral resources would be **less-than-significant**.

13 Noise

Impact 13.a: Short-Term Construction-Related Impacts on Noise

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

While inspection and monitoring of oil and gas facilities would not produce new noise sources, construction noise levels that could result from reasonably foreseeable compliance responses would fluctuate depending on the particular type, number, size, and duration of usage for the varying equipment. However, the types of upgrades and modifications to oil and gas facilities that could be required under the Proposed Regulation would be minimal, consisting of activities such as installation of gathering lines and piping, valves, and hatches. While some oil and gas facilities are located near residential areas, the majority are in areas zoned for industrial uses, away from sensitive receptors. Thus, short-term construction-related impacts would be **less-than-significant**.

Impact 13.b: Long-Term Operational Impacts on Noise

Long-term operations resulting from compliance responses associated with the Proposed Regulation could include the use of a low-NOx combustion device as a management option for destruction of captured methane gas and increased vehicle use as a result of inspections, equipment replacement and repairs, and transporting compressed vapor. While the heavy duty trucks could result in increased noise within facilities, the potential increase in use would not be substantial compared to the existing conditions because they would be present on a short-term basis (e.g., for monitoring or repairing/upgrading equipment). Furthermore, these trips would generally be within existing oil and gas facilities and not affect traffic circulation outside of a project site. The vapor collection and control requirements of the Proposed Regulation may result in collected vapors being stored temporarily at the collection site and then transferred via truck for disposal in the sales gas system, microturbines, fuel gas system or gas disposal wells. Temporary storage of vapors may require additional tanks and compressors and, therefore, ARB does not expect regulated entities to utilize this option.

Noise levels from flaring have been measured as high as 115 A-weighted decibels (dBA) at the source to 55 dBA at distances of 1,800 feet (549 meters) to 3,500 feet (1,067 meters), respectively, and could occur 24 hours per day (Tribal Energy and Environmental Information 2014). The Proposed Regulation could result in the

installation of additional low-NOx combustion devices to dispose of vapor. However, these are fully enclosed devices and have an estimated decibel measurement of 88 dBA[18] at the source and with standard attenuation would result in negligible noise levels in comparison the surrounding environments. Long-term operational impacts related to noise would be **less-than-significant**.

14. Population and Housing

Impact 14: Short-Term Construction-Related and Long-Term Operational Impacts on Population and Housing

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems, installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, valves, low-NOx combustion devices, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Implementation of the Proposed Regulation would increase monitoring, reporting, and equipment repair, which may result in new employment opportunities. Any new jobs created as part of this regulation would not result in a substantial change to the workforce associated with oil and gas, as inspections would generally occur quarterly. Several local air districts have existing inspection and repair programs for oil and gas facilities; therefore, minimal, if any, additional workforce would be required in those regions. In addition, repairs and upgrades associated with requirements under the Proposed Regulations would be minimal and limited to activities such as installation, repair, or replacement of piping, low- NOx combustion devices, tanks, valves, flanges, pneumatic devices and pumps, and hatches, or other components as necessary. Thus, it is reasonable to assume that there would be no substantial population growth, displacement of people, or requirements for additional housing. Thus, short-term construction-related and long-term operational impact would be **less-than-significant**.

[18] Data provided for the CEB 800 Flare via email from Aeron. The data is not an official specification for the device but based on a reliable field test conducted by a third-party consultant. The result is conservative because the measured unit did not have any paneling around the blower, if paneling was installed Aeron estimates that the noise levels would be < 85 dBA. ARB staff believes based on this evaluation and its understanding of the technology, that the results of this test reflect an appropriate conservative estimate of noise impacts from similar equipment.

15. Public Services

Impact 15: Short-Term Construction-Related and Long-Term Operational Impacts on Public Services

As described above under Population and Housing, reasonably foreseeable compliance responses associated with the recommended actions in the Proposed Regulation could result in some new employment opportunities, but would not result in substantial population growth, displacement of people, or requirements for additional housing. Therefore, it would be anticipated that the need for a substantial amount of inspection and construction workers would not occur and that a sufficient employment base would likely be available. Because activities associated with the Proposed Regulation would not require new additional housing or substantial population increases, there would be no additional burden on public services anticipated. Therefore, short-term construction-related and long-term operational impacts associated with public services would be **less-than-significant**.

16. Recreation

Impact 16: Short-Term Construction-Related and Long-Term Operational Impacts on Recreation

As described above under Population and Housing, reasonably foreseeable compliance responses associated with the recommended actions in the Proposed Regulation could result in some new employment opportunities, but would not result in substantial population growth, displacement of people, or requirements for additional housing. Therefore, it would be anticipated that the need for a substantial amount of inspection and construction workers would not occur and that a sufficient employment base would likely be available. Because activities associated with the Proposed Regulation would not require new additional housing or substantial population increases, there would be no additional burden on recreation resources anticipated. Therefore, short-term construction-related and long-term operational impacts associated with recreation would be **less-than-significant**.

17. Transportation and Traffic

Impact 17.a: Short-Term Construction-Related Impacts of Transportation and Traffic

Implementation of the Proposed Regulation would consist of modifications to existing facilities, such as vapor collection systems installation of ambient air or leak detection monitors, and replacement or repair of leaking equipment. Compliance responses associated with the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities. Additionally, the Proposed Regulation would result in the installation

of a grid detection system or wellhead sensors at natural gas underground storage facilities.

Construction workers contracted to implement any necessary modification to existing facilities would require trucks and other vehicles to transport personnel and equipment to the individual oil and gas facilities. However, modifications would not be extensive and would not require a substantial amount of time or personnel to complete. Because there would not be substantial increases to traffic over a long period of time, no changes to applicable traffic plans, ordinances, or policies, air traffic patterns, or roadways design would occur. In addition, activities associated with the Proposed Regulation would not require new additional housing to accommodate construction workers or otherwise generate changes in land use, no additional transportation facilities would be required and there would be no changes to emergency access. Therefore, short-term construction-related impacts associated with transportation and traffic would be **less-than-significant**.

Impact 17.b: Long-Term Operational Impacts on Transportation and Traffic

Implementation of the Proposed Regulation could result in additional traffic trips to accommodate more frequent inspections and to implement modifications and repairs to oil and gas facilities. In many cases, these requirements could be coordinated with existing monitoring requirements for VOCs and other emissions; however, in some areas of the state existing monitoring requirements for VOCs do not exist. These trips to and from the oil and gas facilities would not require a substantial number of vehicles and would be infrequent (i.e., quarterly), as a result these activities would not result in substantial changes to transportation and traffic plans, air traffic patterns, roadway designs, emergency access, or other traffic-related issues.

The vapor collection and control requirements of the Proposed Regulation could, in principle, result in collected vapors being stored temporarily at the collection site and then transferred via truck for disposal in the sales gas system, microturbines, fuel gas system or gas disposal wells but ARB does not believe this compliance response is reasonably foreseeable. This is because temporary storage of vapors may require additional tanks and compressors and, therefore, ARB does not expect regulated entities to utilize this option. However, if employed, these truck trips would be local in nature and are not anticipated to affect transportation and traffic to an extent greater than under the existing operations at any particular oil and gas facility. Thus, long-term operational impacts on traffic and transportation would be **less-than-significant**.

18. Utility Service Systems

Utilities and Service Systems impacts are inherently long-term and related to the operation of facilities; thus, short-term construction-related impacts are not discussed below.

Impact 18: Long-Term Operational Impacts on Utilities and Service Systems

As described above under Population and Housing, reasonably foreseeable compliance responses associated with the recommended actions in the Proposed Regulation could result in some new employment opportunities, but would not result in substantial population growth, displacement of people, or requirements for additional housing. Therefore, it would be anticipated that the need for a substantial amount of inspection and construction workers would not occur and that a sufficient employment base would likely be available. Because activities associated with the Proposed Regulation would not require new additional housing to accommodate or generate changes in land use, no expansion of utilities and service systems would be required; and no deterioration of existing utility and service systems would be expected. Therefore, long-term operational impacts associated with utilities and service systems would be **less-than-significant**.

5.0 CUMULATIVE AND GROWTH-INDUCING IMPACTS

A. Approach to Cumulative Analysis

This section satisfies requirements of the California Environmental Quality Act (CEQA) to discuss how the project could contribute to cumulative impacts. The California Air Resources Board's (ARB's) certified regulatory program (Cal. Code Regs., tit. 17, §60000-60008) does not provide specific direction on a cumulative impacts analysis, and while ARB, by virtue of its certified program, is exempt from Chapters 3 and 4 of CEQA and corresponding sections of the CEQA Guidelines (Cal. Code Regs., tit. 14, §15000 et. seq), the Guidelines nevertheless contain useful information for preparation of a thorough and meaningful cumulative analysis. The CEQA Guidelines require a cumulative impact to be found if the project's incremental effect combined with the effects of other projects is "cumulatively considerable" (Cal. Code Regs., tit. 14, §15130(a)). The discussion of cumulative impacts need not provide as much detail as the discussion of effects attributable to the project alone (Cal. Code Regs., tit. 14, §15130). Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant, but must briefly describe its basis for concluding that the incremental effect is not cumulatively considerable.

In considering cumulative impacts, an agency may choose from among two approaches: it can prepare a list of past, present, and probable future projects that would produce related or cumulative impacts, or it can rely on a summary of projections contained in an adopted planning document or an adopted or certified environmental document for the planning document (Cal. Code Regs., tit. 14, §15130(b)). Further, the CEQA Guidelines state that the pertinent discussion of cumulative impacts contained in one or more previously certified environmental impact reports (EIRs) may be incorporated by reference pursuant to provisions for tiering and program EIRs, and that no further cumulative analysis is required when the lead agency determines the regional and area wide impacts have already been addressed in the prior certified EIR (Cal. Code Regs., tit. 14, § 15130).

The CEQA Guidelines state that a previously approved plan for the reduction of GHG emissions may be used in cumulative impacts analysis, and that the pertinent discussion of cumulative impacts contained in one or more previously certified EIRs may be incorporated by reference (Cal. Code Regs., tit. 14, §15130(d)). Furthermore, no further cumulative impacts analysis is required when a project is consistent with a general, specific, master or comparable programmatic plan where the lead agency determines that the regional or area wide cumulative impacts of the proposed project have already been adequately addressed, as defined in section 15152(f), in a certified EIR for that plan. (Cal. Code Regs., tit. 14, §15130(d)). CEQA further directs that a tiered EIR focus on significant environmental effects that were not already analyzed in the previous environmental analysis. (Pub. Resources Code §21068.5; 21093; see also 21094(c).)

For purposes of this analysis, ARB is relying on the summary of projections contained in the Environmental Analysis (EA) prepared for the 2014 First Update to the Climate Change Scoping Plan (Scoping Plan Update EA). The Scoping Plan Update EA provided a program level review of significant adverse impacts associated with the reasonably foreseeable compliance responses that appeared most likely to occur as a result of implementing the recommended actions identified in each of the nine sectors discussed in the Scoping Plan Update. The impact discussion includes, where relevant, construction-related effects, operational effects of new or modified facilities, and influences of the recommended actions on greenhouse gas (GHG) and air pollutant emissions. The Scoping Plan Update EA considered cumulative impacts of a full range of reasonably foreseeable compliance responses to all the recommendations in all nine sectors, including this Proposed Regulation in the Energy Sector, along with the expected background growth in California in its impacts conclusions for each resource topic area. The Scoping Plan Update EA considered the cumulative effect of other "closely related" past, present, and future reasonably foreseeable activities undertaken to reduce GHGs in response to statewide programs and policies, as well other activities with "related impacts" (Cal. Code Regs., tit. 14, §15355(b); 15130(a)(1)). ARB has determined that the cumulative effects of the Proposed Regulation have been examined at a sufficient level of detail in the Scoping Plan Update EA.[19] Therefore, ARB has determined that for a cumulative analysis of the Proposed Regulation, it is appropriate to rely on the cumulative analysis contained in the Scoping Plan Update EA, which is the statewide plan designed to reduce GHGs. The analysis of the Scoping Plan Update EA is hereby incorporated by reference. The portions of the Scoping Plan Update EA relevant to this discussion are also summarized below.

The analysis of cumulative impacts includes the following:

- A summary of the cumulative impacts found for each resource area in the Scoping Plan Update EA in May 2014.
- A discussion of the types of compliance responses associated with the Proposed Regulation, pertinent to each resource area.
- A significance conclusion that determines if the Proposed Regulation could result in a significant cumulative effect or a considerable contribution to an existing significant cumulative impact.

This approach to cumulative impacts analysis is "guided by the standards of practicality and reasonableness" (Cal. Code Regs., tit. 14, §15130(b)) and serves the purpose of providing "a context for considering whether the incremental effects of the project at

[19] A copy of the Scoping Plan Update EA is available at http://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm.

issue are considerable" when judged "against the backdrop of the environmental effects of other projects." (*CBE v. Cal. Res. Agency* (2002) 103 Cal.App.4th 98, 119).

1. Summary of the Scoping Plan Update Compliance Responses

The Scoping Plan Update EA provided a program-level review of significant adverse impacts associated with the reasonably foreseeable compliance responses that appeared most likely to occur as a result of implementing the recommended actions identified in each of the nine sectors discussed in the Scoping Plan Update. The impact discussion includes, where relevant, construction-related effects, operational effects of new or modified facilities, and influences of the recommended actions on GHG and air pollutant emissions. The Scoping Plan Update EA, certified by the Board in 2014, was prepared as a program environmental document for the entire statewide plan of GHG reductions projects, including the Proposed Regulations. The EA is available online at http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm

The Scoping Plan Update considered nine sectors: energy, transportation, agriculture, water waste management, natural and working lands, short-lived climate pollutants, green buildings, and cap-and-trade regulation. The compliance responses associated with these sectors are described as follows.

a) Energy Sector under the Scoping Plan Update

Reasonably foreseeable compliance responses evaluated in the Scoping Plan Update EA ranged from small modifications to existing structures to utility-scale renewable energy projects. For instance, the EA considered energy storage systems that could be developed by modifying existing hydroelectric dams; and smart-grid technology such as the installation of smart meters. Improvements to energy production, processing, storage, distribution, and transmission systems were considered, and consist of general housekeeping, vapor recovery valves, and frequent maintenance checks. In addition, renewable energy projects were considered, including the installation of solar panels and micro-turbines onto buildings (e.g., to create zero net energy buildings or combined heat and power systems) to large-scale energy generation facilities, such as solar photovoltaic and wind turbine farms, and geothermal plants

The Proposed Regulation is included in the Energy Sector of the Scoping Plan Update.

b) Transportation Sector under the Scoping Plan Update

The Scoping Plan Update contains four main types of recommended actions associated with the Transportation Sector: (1) improve vehicle efficiency and develop zero-emission technologies; (2) reduce the carbon content of fuels and provide market support to encourage the use of these fuels; (3) plan for and develop communities that would minimize vehicular GHG emissions and provide more transportation options; and (4) improve the efficiency and throughput of existing transportation systems. Reasonably foreseeable compliance responses evaluated in the Scoping Plan Update EA consisted of an increased demand for, and associated manufacturing of, a variety of

alternative fuel and/or low- and zero-emission technologies and related fueling infrastructure. Increased demand for products, such as standard hybrid, plug-in hybrid electric, battery electric, and fuel-cell vehicles and trucks, were determined to require development of new and/or modified manufacturing plants. In addition, installation of fixed-guideway systems to transport shipment containers, installed at marine ports and near dock rail yards, was evaluated.

A separate EA has been prepared to evaluate the environmental effects of implementing the proposed Low Carbon Fuel Standard and Alternative Diesel Fuels Regulation, which was certified in 2015. The EA is available online at http://www.arb.ca.gov/regact/2015/lcfs2015/lcfs2015.htm.

c) Agriculture Sector under the Scoping Plan Update

The types of recommended actions for the Agriculture Sector involve GHG emission reduction and carbon sequestration opportunities. Reasonably foreseeable compliance responses evaluated in the Scoping Plan Update consisted of nitrogen management, manure management, soil management practices, water and fuel technologies, and land use planning to enhance, protect, and conserve lands in California.

d) Water Sector under the Scoping Plan Update

The Scoping Plan Update contains three types of recommended actions to reduce water-related energy use: (1) prioritizing investments in conservation; (2) adopting rate structures and pricing that maximize conservation; and (3) promoting less-energy intensive water management, such as a comprehensive groundwater policy. Reasonably foreseeable compliance responses evaluated under the Water Sector in the Scoping Plan Update EA are primarily related to the development of policies, guidance, and funding plans. These plans generally aim to provide energy conservation and efficiency measures associated with water supply, conservation, water recycling, stormwater reuse, and wastewater-to-energy goals. These actions could result in the reasonably foreseeable compliance responses of increased development of water resource facilities, such as water recycling facilities, detention structures for reuse of stormwater, and wastewater treatment-related capture of biogas for energy use. Development of new and/or modified recycled water and wastewater plants could also occur.

e) Waste Management Sector under the Scoping Plan Update

The Scoping Plan Update contains programs that would eliminate disposal of organic materials at landfills. Options considered included: legislation, direct regulation, and inclusion of landfills in Cap-and-Trade. Implementation of the recommended actions in the Waste Management sector were determined to result in construction of new, or expansion of existing, composting and anaerobic digestion facilities. These facilities would be necessary to accommodate actions such as increased recycling, development of biomass facilities, and anaerobic digestion facilities. In addition, reasonably foreseeable compliance responses may include installation of methane control devices

at existing landfills. While some of these activities could occur within existing landfills, construction of new facilities may be necessary to accommodate increased demand of organic waste diversion.

f) Natural and Working Lands Sector under the Scoping Plan Update

The Scoping Plan Update addressed planning efforts aimed at urban, natural and working lands, and agricultural croplands within and across jurisdictions, which all are considered to create interconnected land areas and ecosystems. Reasonably foreseeable compliance responses involve coordination between state agencies including: California Natural Resources Agency, California Environmental Protection Agency, California Department of Food and Agriculture, California Department of Forestry and Fire Protection, California Department of Fish and Wildlife, and ARB to develop land use programs. These programs generally aim to increase urban forest canopy cover and limit the conversion of croplands, forests, rangeland, and wetlands to urban uses. In addition, increased use of green infrastructure was evaluated, such as vegetation and soils to manage stormwater runoff, rainwater harvesting, bioswales, permeable pavement, and green (e.g., growing media and vegetation) roofs. In addition to land use planning efforts, the Natural and Working Land Sector included encouragement of the use of urban, agricultural, and forest wastes to produce electricity and transportation fuels (e.g., biomass facilities).

g) Short-Lived Climate Pollutants Sector under the Scoping Plan Update

Under the Scoping Plan Update, the short-lived climate pollutant sector addressed ozone depleting substances (ODS), a large group of chemicals known to destroy the stratospheric ozone layer when released into the atmosphere. ODS were historically used in a wide variety of applications, including refrigerants, foam blowing agents, solvents, and fire suppressants. Four general concepts were associated with the Short-Lived Climate Pollutants Sector within the Scoping Plan Update: high-global warming potential (GWP) fluorinated gas phasedown, low-GWP requirements, ODS recovery and destruction, and high-GWP fees. Reasonably foreseeable compliance responses consisted of replacement of high-GWP compounds with low-GWP compounds, which was considered to require construction of new manufacturing facilities or modification of existing manufacturing facilities.

ARB staff presented an informational update on the Proposed Short-Lived Climate Pollutant Reduction Strategy, and associated Draft EA, to the Board on May 19, 2016. Public comment on both documents closed on May 26, 2016. ARB staff will be presenting the Proposed Short-Lived Climate Pollutant Reduction Strategy and associated Final EA and response to environmental comments to the Board for consideration in late summer/early fall 2016. More information can be found at: http://www.arb.ca.gov/cc/shortlived/shortlived/shortlived.htm

h) Green Buildings Sector under the Scoping Plan Update

The Scoping Plan Update evaluated development of a comprehensive GHG emission reduction program for new construction, existing building retrofits, and operation and maintenance of certified green buildings. This program would include an integrated approach to development of zero-net-carbon buildings (i.e., net zero carbon emissions over a period of a year). Reasonably foreseeable compliance responses associated with these recommended actions could consist of new requirements that result in an increase in zero net energy and zero-net-carbon buildings. This could be accomplished through increased carbon sequestering features (e.g., urban forestry), onsite renewable energy supplies (e.g., solar, wind turbines, waste digesters), fuel cells, and construction of carbon offset technologies, including solar PV or wind turbine farms.

i) Cap-and-Trade Regulation Sector under the Scoping Plan Update

Under the Scoping Plan Update, the Cap-and-Trade Regulation was considered to be a vital component for achieving California's longer-term, emission-reduction goals. The Cap-and-Trade Regulation creates a gradually declining limit on the sources responsible for 85 percent of California's GHG emissions, establishes the price signal needed to drive long-term investment in cleaner fuels and more efficient use of energy, and affords covered entities the flexibility to seek out and implement the lowest-cost options to reduce emissions. The Cap-and-Trade Regulation places an aggregated emissions cap on the total emissions generated by all covered facilities in the program. Over time, the cap will steadily decline. Reasonably foreseeable compliance responses evaluated under the Scoping Plan Update EA include the existing Cap-and-Trade Regulation's provision allowing for additional offset protocols: U.S. Forest Projects, Urban Forest Projects, Livestock Projects, and ODS Compliance, as well as the provisions regarding sector-based offset crediting programs. In addition, compliance responses related to covered entities under the Cap-and-Trade Regulation consist of upgrading equipment, switching to lower intensity carbon fuels, and implementing maintenance and process changes at existing facilities.

ARB has designed a California cap-and-trade program that is enforceable and meets the requirements of AB 32. The development of this program included a multi-year stakeholder process and consideration of potential impacts on disproportionately impacted communities. The program began on January 1, 2012, with an enforceable compliance obligation starting with 2013 GHG emissions. ARB is currently administering a public process to develop potential 2016 amendments to the Cap-and-Trade Regulation. The public process will help inform potential changes effective for the post-2020 program.

2. Summary of the Scoping Plan Update Environmental Impacts

The Scoping Plan Update EA evaluated the environmental impacts related to the reasonably foreseeable compliance responses described above. Table 5-1 provides a summary of the conclusions of these impacts.

Table 5-1
Summary of Scoping Plan Update EA Impacts by Sector

	Energy Sector	Transportation Sector	Agriculture Sector	Water Sector	Waste Management Sector	Natural and Working Lands Sector	Short-Lived Climate Pollutants Sector	Green Buildings	Cap-and-Trade Regulation 2
Aesthetics									
Short-Term Construction Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	LTS
Long-Term Operational Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	
Agriculture and Forest Resources									
Short-Term Construction Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	PSU
Long-Term Operational Impacts	SU	SU	B	SU	SU	SU	SU	SU	
Air Quality									
Short-Term Construction Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	LTS
Long-Term Operational Impacts	LTS	SU	B	LTS	LTS/ SU[1]	SU	LTS	B	

Table 5-1
Summary of Scoping Plan Update EA Impacts by Sector

	Energy Sector	Transportation Sector	Agriculture Sector	Water Sector	Waste Management Sector	Natural and Working Lands Sector	Short-Lived Climate Pollutants Sector	Green Buildings	Cap-and-Trade Regulation 2
Biological Resources									
Short-Term Construction Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	PSU
Long-Term Operational Impacts	SU	SU	B	SU	SU	LTS	SU	SU	
Cultural Resources									
Short-Term Construction Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	PSU
Long-Term Operational Impacts	NA	NA	NA	NA	NA	NA	NA	NA	
Energy Demand									
Short-Term Construction Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	B
Long-Term Operational Impacts	B	B	B	LTS	B	B	LTS	B	
Geology and Soils									
Short-Term Construction Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	PSU
Long-Term Operational Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	
Greenhouse Gas									
Short-Term Construction Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Long-Term Operational Impacts	B	B	B	B	B	LTS	B	B	B
Hazards and Hazardous Materials									
Short-Term Construction Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	LTS
Long-Term Operational Impacts	SU	LTS	LTS	LTS	LTS	LTS	LTS	LTS	

Table 5-1
Summary of Scoping Plan Update EA Impacts by Sector

	Energy Sector	Transportation Sector	Agriculture Sector	Water Sector	Waste Management Sector	Natural and Working Lands Sector	Short-Lived Climate Pollutants Sector	Green Buildings	Cap-and-Trade Regulation 2
Hydrology and Water Quality									
Short-Term Construction Impacts	SU	SU	B	SU	SU	SU	SU	SU	PSU
Long-Term Operational Impacts	SU	SU	B	SU	SU	B	SU	SU	
Land Use Planning									
Short-Term Construction Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	PSU
Long-Term Operational Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	
Mineral Resources									
Short-Term Construction Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Long-Term Operational Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	
Noise									
Short-Term Construction Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	PSU
Long-Term Operational Impacts	SU	LTS	LTS	LTS	LTS	SU	LTS	SU	
Population and Housing									
Short-Term Construction Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Long-Term Operational Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	
Public Services									
Short-Term Construction Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Long-Term Operational Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	

Table 5-1
Summary of Scoping Plan Update EA Impacts by Sector

	Energy Sector	Transportation Sector	Agriculture Sector	Water Sector	Waste Management Sector	Natural and Working Lands Sector	Short-Lived Climate Pollutants Sector	Green Buildings	Cap-and-Trade Regulation 2
Recreation									
Short-Term Construction Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Long-Term Operational Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	
Transportation/Traffic									
Short-Term Construction Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	PSU
Long-Term Operational Impacts	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	
Utilities and Service Systems									
Short-Term Construction Impacts	NA	NA	NA	NA	NA	NA	NA	NA	LTS
Long-Term Operational Impacts	SU	SU	LTS	SU	SU	SU	SU	SU	

Notes: B = Beneficial; LTS = Less-than-significant; NA = Not Applicable; SU = Potentially Significant and Unavoidable After Mitigation.
[1]Long-term operational impacts were identified as LTS, but odor-related impacts were identified as significant and unavoidable in the Waste Management sector.
[2] Impacts related to the Cap-and-Trade regulation include the effects associated with offset protocol adopted after the adoption of the Cap-and-Trade regulation

The 2030 Target Scoping Plan Update is currently in development and a draft plan is scheduled to be released in 2016. The types of activities related to the 2030 target update, and their associated environmental effects are currently not known, but are expected to continue the programs adopted in the first update to the Scoping Plan, plus other actions. Thus, while the 2030 Target Scoping Plan Update is considered to be a future related project, the potential cumulative effects are not yet known and cannot be known at this time, except as they relate to continuation of programs from the first update.

B. Significance Determinations and Mitigation

Implementation of the Proposed Regulation was determined to potentially result in cumulatively considerable contributions to significant cumulative impacts in certain resource areas, as discussed below. While suggested mitigation is provided for each potentially cumulatively considerable impact, the mitigation needs to be implemented by other agencies. Where impacts cannot be feasibly mitigated, the Draft EA recognizes the impact as significant and unavoidable. The Board would need to adopt Findings and a Statement of Overriding Considerations for any significant and unavoidable environmental effects of the project as part of the approval process.

C. Cumulative Impacts by Resource Area

1. Aesthetics

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-oxides of nitrogen (NOx) combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. While construction or installation of some of these features could potentially alter the appearance of some existing visual settings, the presence of construction equipment would not substantially affect the visual character of an industrial site because a variety of operation and maintenance activity is typical within oil and gas facilities. Because individual project sites would be located within highly disturbed, industrial areas, no scenic vistas or scenic resources would be adversely affected. Upon completion of construction, the Proposed Regulation would result in installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, valves, pneumatic devices and pumps, and other similar features already associated with oil and gas facilities and would not result in substantially adverse effects on aesthetic resources.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. The Scoping Plan Update EA found that implementation of the recommended actions within the various sectors discussed in the Plan, which included the recommendation for the Proposed Regulation under the Energy Sector, could result in a significant cumulative impact to aesthetic resources. As discussed in the Scoping Plan Update EA, there is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction and operation of these facilities (although likely to occur in areas zoned or used for manufacturing or industrial purposes), could conceivably introduce or increase the presence of artificial elements (e.g., heavy-duty equipment, removal of existing vegetation, buildings) in areas of scenic importance, such as visibility from a State scenic highway. The visual impact of such development would depend on several variables, including the type and size of facilities, distance and angle of view, visual absorption and placement in the landscape. In addition, facility operation may introduce

substantial sources of glare, exhaust plumes, and nighttime glare from lighting for safety and security purposes. Implementation of mitigation measures would not reduce these impacts to a less-than-significant level because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update could result in a significant cumulative impact on aesthetic resources.

Under the Proposed Regulation, compliance responses would result in less-than-significant effects from individual oil and gas facilities. Because any effects would be site-specific in nature and not visible from other similar oil and gas facilities, and consistent with the existing oil and gas facilities' industrial settings, the Proposed Regulation **would not result in a cumulatively considerable contribution to a significant cumulative impact on aesthetic resources**.

2. Agricultural and Forest Resources

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. Oil and gas facilities are often located in areas zoned for industrial uses; however, wells and equipment may also be located in residential areas or within the boundaries of incorporated cities and on grazing lands at lease. No conversion of agricultural or forest resources would be required or expected through implementation of the Proposed Regulation.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. The Scoping Plan Update EA found that implementation of the recommended actions within the various sectors discussed in the Plan, which included the recommendation for the Proposed Regulation under the Energy Sector, could result in a significant cumulative impact to agricultural and forest resources. As discussed in the Scoping Plan Update EA, there is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction of new facilities could result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, Williamson Act conservation contracts, or forest land or timberland, resulting in the loss of these resources. Because ARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels. Compliance with existing land use policies, ordinances, and regulations would serve to minimize this impact. Land use impacts would be further addressed for individual projects through the local development review process. Mitigation measures that would be applied through the development review process were identified that could reduce these impacts. However, because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and because of the

programmatic nature of this EA, impacts were determined to be potentially significant and unavoidable. Thus, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update could result in a significant cumulative impact on agricultural and forest resources.

Under the Proposed Regulation, impacts on agricultural and forest resources would be less-than-significant. Because no conversion of agricultural or forest resources would be required or expected through implementation of the Proposed Regulation, and because the Proposed Regulation would not affect agricultural or forest resources to a degree beyond the oil and gas facilities' existing operations, **no cumulatively-considerable contribution to a significant adverse impact to agricultural and forest resources** would occur.

3. Air Quality

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. Implementation of reasonably foreseeable compliance responses associated with the Proposed Regulation could require construction activities associated with new or modified facilities. Specific, project-related construction activities could result in increased generation of short-term criteria air pollutants and toxic air contaminants in limited amounts associated with the transport of necessary equipment, trenching for piping, and installation of new features. The types of upgrades and modifications to oil and gas facilities that could be required under the Proposed Regulation would be minimal, thus short-term construction-related air quality impacts would not be substantial.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. The Scoping Plan Update EA found that implementation of the recommended actions within the various sectors discussed in the Plan, which included the recommendation for the Proposed Regulation under the Energy Sector, could result in a significant cumulative impact to air quality. As discussed in the Scoping Plan Update EA, reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could result in an increase in criteria air pollutants and toxic air contaminants, as well as generate unpleasant odors that could affect sensitive receptors. These would be generated by the use of heavy-duty construction equipment on a short-term basis, as well as longer-term operational impacts associated with biomass, anaerobic digestion and composting facilities; and LCFS. Therefore, the Scoping Plan Update could generate emission levels that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected ambient air quality standard violation, result in a cumulatively considerable net increase in non-attainment areas, or expose sensitive receptors to substantial pollutant concentrations or odors. However, all

projects, no matter their size or type would be required to seek local or State land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review consistent with California environmental review requirements (e.g., CEQA) and other applicable local requirements (e.g., local air district rules and regulations). This environmental review process would assess whether project implementation would result in short-term construction and long-term operational air quality impacts.

Mitigation measures that would be applied through the development review process were identified that could reduce these impacts. However, because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and because of the programmatic nature of the Scoping Plan Update EA, impacts were determined to be potentially significant and unavoidable. Thus, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update could result in a significant cumulative impact on air quality.

The Proposed Regulation was designed to minimize any potential air quality impacts. The use of combustion controls is disfavored, and is available only if other options are not technologically feasible. Moreover, combustion controls may only be used if they are highly efficient, with the result that this potential compliance response to the Proposed Regulation would, on the whole, result in the replacement of older, inefficient combustion controls with less polluting controls. Other long-term compliance responses will result in vehicle emissions from increased vehicle activity to comply with the LDAR requirements of the Proposed Regulation. As is discussed in Chapter 4 above, the net result is a decrease in NOx emissions in the San Joaquin Valley, which is predominantly affected by the regulation, from the current baseline, a significant decrease in CO emissions. Additionally, ARB's analysis found increases of 0.9 tons per year of PM10 and 0.3 tons per year of PM 2.5 as well as negligible increases in other criteria pollutants in the San Joaquin Valley. The Proposed Regulation provides substantial statewide emission benefits of hydrocarbons and VOCs as well as smaller benefits of the BTEX suite of chemicals. Where there are emission increases, the Proposed Regulation would result in negligible net emission increases for most air districts. Air district permitting and CEQA thresholds for criteria pollutants are typically developed to address both direct and cumulative air quality impacts. Where ARB identified potential increases in net emissions, the emissions remain well below the level of CEQA significance that districts have set for cumulative significance, and district permitting requirements may also provide further mitigation. Though not required by law, staff also assessed the impacts of the emissions from a hypothetical baseline in which flaring emissions in the San Joaquin Valley were greatly reduced by other proposed measures. In that instance, the nominal increase in NOx, and all other criteria air pollutants, is still well below the threshold established by the air district for cumulative significance

Thus, **no cumulatively-considerable contribution to a significant adverse impact to air quality** would occur.

4. Biological Resources

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. The biological resources that could be affected as a result of implementation of the Proposed Regulation would depend on the specific location of any necessary construction and its environmental setting. Nonetheless, there are plant and animal species that occur, or even thrive, in developed settings. Also, activities that require disturbance of undeveloped areas, such as the construction of new structures, roads or paving have the potential to adversely affect plant or animal species that may reside in those areas. Harmful impacts from construction-related activities could result in direct mortality of species from destruction of dens, burrows, or nests through ground compaction, ground disturbance, debris, or vegetation removal within oil and gas facility sites. Indirect impacts to animals could result from noise disturbance that might cause nest or den abandonment and loss of reproductive or foraging potential around the site during construction, transportation, or destruction of equipment

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of reasonably foreseeable compliance responses associated with recommended actions in the Scoping Plan Update could require construction and operational activities associated with new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. These activities would have the potential to adversely affect biological resources (e.g., species, habitat) that may reside or be present in those areas. Because there are biological species that occur, or even thrive, in developed settings, resources could also be adversely affected by construction and operations within disturbed areas at existing manufacturing facilities or at other sites in areas with zoning that would permit the development of manufacturing or industrial uses.

The biological resources that could be affected by construction and operation associated with implementation of new regulations and/or incentive measures under the Scoping Plan Update would depend on the specific location of any necessary construction and its environmental setting. Harmful impacts could include modifications to existing habitat; including removal, degradation, and fragmentation of riparian systems, wetlands, or other sensitive natural wildlife habitat and plan communities; interference with wildlife movement or wildlife nursery sites; loss of special-status species; and/or conflicts with the provisions of adopted habitat conservation plans, natural community conservation plans, or other conservation plans or policies to protect natural resources. Implementation of mitigation measures would not reduce these impacts to a less-than-significant level. Thus, the Scoping Plan Update EA found that

the recommended actions in the Scoping Plan Update could result in a significant cumulative impact on biological resources.

The short-term construction-related contribution of the Proposed Regulation to this significant impact would be cumulatively considerable, given the conclusion in Chapter 4 that the Proposed Regulation may result in a short-term construction-related significant adverse impact on biological resources. Implementation of mitigation measures described in Chapter 4 could reduce these short-term construction-related impacts to a less-than-significant level; however, the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. As a result, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts. Thus, the Proposed Regulation **could result in an unavoidable, considerable contribution to a significant cumulative impact on biological resources** related to short-term construction activities.

Long-term operational impacts on biological resources would be less-than-significant. Because monitoring (e.g., inspections, repairs) and reporting activities and collection and disposal of vapors would not be anticipated to affect biological resources to an extent greater than under the existing operations at any particular oil and gas facility, the Proposed Regulation **would not result in an unavoidable, considerable contribution to a significant cumulative impact on biological resources** related to long-term operational activities.

5. Cultural Resources

As described in Chapter 4, above, cultural resource impacts are inherently construction-related, since they may result from ground disturbance. Therefore, the long-term implementation of the Proposed Regulation would not adversely affect cultural resources.

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. Implementation of the Proposed Regulation could result in earth-moving activities that could affect cultural resources. The cultural resources that could potentially be affected by ground disturbance activities could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological sites associated with agriculture and mining, and heritage landscapes. Properties important to Native American communities and other ethnic groups, including tangible properties possessing intangible traditional cultural values, also may exist.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction activities associated with new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction activities could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Demolition of existing structures may also occur before the construction of new buildings and structures. The cultural resources that could potentially be affected by ground disturbance activities could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological sites associated with agriculture and mining, and heritage landscapes. Properties important to Native American communities and other ethnic groups, including tangible properties possessing intangible traditional cultural values, also may exist. Historic buildings and structures may also be adversely affected by demolition-related activities. Such resources may occur individually, in groupings of modest size, or in districts. Because culturally sensitive resources can also be located in developed settings, historic, archeological, and paleontological resources, and places important to Native American communities, could also be adversely affected by construction of new facilities. Implementation of mitigation measures could reduce these impacts, however because the authority to determine specific project-level impacts and mitigation is outside the purview of ARB, any mitigation identified would not reduce these impacts to a less-than-significant level. Thus, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update could result in a significant cumulative impact on cultural resources.

The Proposed Regulation's contribution to this significant impact would be cumulatively considerable, given the conclusion in Chapter 4 that the Proposed Regulation may result in a significant adverse impact on cultural resources due to the construction and installation of equipment and infrastructure needed to comply with the Proposed Regulation. Implementation of mitigation measures described in Chapter 4 could reduce these impacts to a less-than-significant level; however, the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. As a result, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts. Thus, the construction activities associated with the Proposed Regulation **could result in a cumulatively considerable contribution to a significant cumulative impact on cultural resources**. The long-term implementation of the Proposed Regulation would not adversely affect cultural resources.

6. Energy Demand

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges,

low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operational activities associated with new or modified facilities or infrastructure. Temporary increases in energy demand associated with new facilities would include fuels used during construction, and gas and electric operational demands. Typical earth-moving equipment that may be necessary for construction includes: graders, scrapers, backhoes, jackhammers, front-end loaders, generators, water trucks, and dump trucks. While energy would be required to complete construction for any new or modified facilities or infrastructure projects, it would be temporary and limited in magnitude and would not result in sustained increases in demand that would adversely affect energy supplies. Therefore, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update would not result in a cumulative impact relative to construction-related energy demand.

However, the Scoping Plan Update EA found that long-term operational energy demand impacts associated with the recommended actions under the Scoping Plan Update would be primarily beneficial, and thus no cumulative impact on long-term operational energy demand would occur.

Implementation of the Proposed Regulation would result in less-than-significant impacts on energy demand. Activities associated with the Proposed Regulation would be similar to maintenance activities already required to maintain oil and gas facilities, that is, temporary and limited in magnitude. In the long term, the potential for an increase in fuel consumption would be site-specific and dependent on the particular methods used to comply with the Proposed Regulation. Furthermore, in the case that vapor disposal methods use microturbines or other productive use of captured vapor, energy demand could be decreased as these systems produce electricity that could offset energy needs associated with facilities. Any increases in energy consumption would be minimal and not substantial in comparison to the demand associated with an oil and gas facility; thus, **no cumulatively considerable contribution to a significant adverse impact to energy demand** would occur.

7. Geology and Soils

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. Under the Proposed Regulation, underground piping alignments and staging areas could be located in a variety of geologic, soil, and slope

conditions with varying amounts of vegetation that would be susceptible to soil compaction, soil erosion and loss of topsoil during construction. The level of susceptibility varies by location. However, the specific design details, siting locations, and soil compaction and erosion hazards for particular manufacturing facilities are not known at this time and would be analyzed on a site-specific basis at the project level.

Implementation of the Proposed Regulation could result in increased volumes of materials (i.e., methane) injected into underground wells. Use of underground injection wells has been associated with induced seismicity in several locations, including Colorado, Texas, Arkansas, Oklahoma, and Ohio. If a company chooses to inject collected methane, it would use an existing gas disposal well since new or repurposed wells are not allowed. In the case that an oil and gas facility would need to inject additional gas into an existing gas disposal well, DOGGR analysis and permit approval would be required. Consequently, the Proposed Regulation would not substantially increase the risk of induced seismicity above existing conditions.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of the reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operational activities associated with new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction and operation could be located in a variety of relatively high-risk geologic and soil conditions that are considered to be potentially hazardous. For instance, the seismic conditions at the site of a new facility may have high to extremely high seismic-related fault rupture and ground shaking potential associated with earthquake activity. New facilities could also be subject to seismic-related ground failure, including liquefaction and landslides. Construction and operational activities could be located in a variety of geologic, soil, and slope conditions with varying amounts of vegetation that would be susceptible to soil erosion. Strong ground shaking could also trigger landslides in areas where the natural slope is naturally unstable or is over-steepened by the construction of access roads and structures. Construction and operation could also occur in locations that would expose facilities and structures to expansive soil conditions. Development of new facilities could be susceptible to the presence of expansive soils particularly in areas of fine-grained sediment accumulation typically associated with playas, valley bottoms, and local low-lying areas. These geologic, seismic, and soil-related conditions could result in damage to structures, related utility lines, and access roads, blocking access and posing safety hazards to people. Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and since the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Thus, The Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update could result in a significant cumulative impact on geology and soils.

The Proposed Regulation's contribution to this significant impact would be cumulatively considerable, given the conclusion in Chapter 4 that the Proposed Regulation may result in a short-term construction-related significant adverse impact on geology and soils. Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval or permitting agency for individual projects, and since the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Implementation of mitigation measures described in Chapter 4 could reduce these impacts to a less-than-significant level; however, the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. As a result, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts. Thus, the Proposed Regulation **could result in an unavoidable, considerable contribution to a significant cumulative impact on geology and soils** related to short-term construction activities.

As discussed above, implementation of the Proposed Regulation could result in increased volumes of methane injected into underground wells. Due to permitting requirements set forth by DOGGR, the Proposed Regulation would not substantially increase the risk of induced seismicity above existing conditions. At this time, it is unknown how many facilities may choose to dispose of waste methane into a gas disposal well. There is evidence to suggest that increased pressure and rate of disposal in underground injection wells contributes to higher risk of seismic hazards. However, research into these issues in ongoing, and difficult to determine in California, where naturally occurring earthquakes are very frequent and tectonic forces have widespread influence (CCST 2015). In addition, where methane injection would occur, the Proposed Regulation is expected to increase the total amount of gas currently injected into the operators' gas disposal wells by about three percent. Therefore, the volume of material injected into the well will be increased only very slightly by the methane associated with the Proposed Regulation. Thus, the Proposed Regulation **would not result in a cumulatively considerable contribution to a significant cumulative impact on geology and soils** related to long-term operational activities.

8. Greenhouse Gases

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. Implementation of reasonably foreseeable compliance responses associated with the Proposed Regulation could require construction activities associated with new or modified facilities. Specific, project-related construction activities could result in increased generation of short-term GHG emissions in limited amounts associated with the transport of necessary equipment, trenching for piping, and installation of new features. However, a majority of local agencies (e.g., air pollution

control districts) do not recommend or require the quantification of short-term construction-generated GHGs for typical construction projects because these only occur for a finite period of time (e.g., during periods of construction) that is typically much shorter than the operational phase. Furthermore, the types of upgrades and modifications to oil and gas facilities that could be required under the Proposed Regulation would be minimal. Some long-term operational compliance responses may result in CO_2 emissions (i.e., combustion, increased vehicle miles), these emissions would be in lieu of the release of methane into the atmosphere, which has a substantially higher global warming potential (GWP) than CO_2. Furthermore, additional vehicle trips would be local in nature and would not be anticipated to affect GHG emissions to an extent greater than under the existing operations at any particular oil and gas facility.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction activities associated with new or modified facilities or infrastructure. Specific, project-related construction activities could result in increased generation of short-term GHG emissions in limited amounts associated with the use of heavy-duty off-road equipment, materials transport, and worker commutes. A majority of local agencies (e.g., air pollution control districts) do not recommend or require the quantification of short-term construction-generated GHGs for typical construction projects because these only occur for a finite period of time (e.g., during periods of construction) that is typically much shorter than the operational phase, and agencies generally recommended that GHG analyses focus on operational phase emissions, unless the project is of a unique nature requiring atypical (e.g., large scale, long-term) activity levels (e.g., construction of a new dam or levee) for which quantification and consideration (e.g., amortization of construction emissions over the lifetime of the project) may be recommended. Thus, the Scoping Plan Update EA found that short-term construction related GHG emission impacts associated with reasonably-foreseeable compliance responses for the recommended actions in the Scoping Plan Update are considered less-than-significant when considered in comparison to the overall GHG reduction associated with implementation of the Scoping Plan Update.

As with the Scoping Plan Update, the long-term operational impacts to GHG emissions from the recommended actions of the Proposed Regulation are beneficial, consistent with the goals and objectives of the Scoping Plan Update to reduce emissions to achieve 2020 and post-2020 emission reduction goals. Thus, the Proposed Regulation **would not result in a cumulatively considerable contribution to a significant cumulative impact on GHG emissions**.

9. Hazards and Hazardous Materials

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges,

low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. The management of hazardous materials and hazardous wastes would require permits from applicable federal, state, and local regulating agencies. Specific applicable laws and regulations that would apply include (but are not limited to) the Hazardous Waste Program specified under Resource Conservation and Recovery Act, the Toxic Substances Control Act, the Comprehensive Environmental Response Compensation and Liability Act, the Hazardous Materials Transportation Act and other applicable laws and regulations. In addition, it is expected that an oil and gas facility would already have secured such approval pursuant to these regulations and that the implementation of the project would not substantially change the routine transport, storage, use, and disposition of such hazardous materials and resulting wastes. In addition, under the Proposed Regulation, collected vapors may be injected into existing, permitted underground wells. These wells are subject to Class II permit requirements. Class II injection wells fall under DOGGR's Underground Injection Control (UIC) program, which is monitored and audited by the U.S. EPA (see Section 1.C for more information).

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Construction activities may require the transport, use, and disposal of hazardous materials. Construction activities generally use heavy-duty equipment requiring periodic refueling and lubricating. Large pieces of construction equipment (e.g., backhoes, graders) are typically fueled and maintained at the construction site. However, the transport, use, and disposal of hazardous materials would be required to comply with all applicable federal, State and local laws (see Attachment 1 of this Draft EA). In addition, although there is uncertainty as to the exact locations where new facilities could be constructed or where existing facilities could be reconstructed, these would likely occur within footprints of existing manufacturing facilities, or in areas with zoning that would permit the development of manufacturing or industrial uses. As a result, construction-related impacts associated with hazards and hazardous materials would be less-than-significant.

In addition, because potential facilities would likely occur within footprints of existing manufacturing facilities, the recommended actions in the Scoping Plan Update would not be expected to result in locating new facilities near schools, public (or public use) airports, private airstrips, or wildlands; or on sites included on a list of hazardous materials sites or impair implementation of or physically interfere with an adopted emergency response or evacuation plan. In addition, as noted above, the handling of hazardous materials would be required to comply with all applicable federal, State and local laws. As a result, operational impacts associated with hazards and hazardous materials would be less-than-significant. Therefore, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update would not result in cumulative hazards or hazardous materials impacts.

Implementation of the Proposed Regulation would result in less-than-significant impacts on hazards and hazardous materials. Because it is expected that an oil and gas facility would secure approval and permits related to the routine transport, storage, use, and the area of effects would be limited to a particular project site, there would be **no cumulatively-considerable contribution to a significant adverse impact to hazards and hazardous materials**.

10. Hydrology and Water Quality

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. Under the Proposed Regulation, earth-moving activities that could affect hydrology and water quality would be limited to installation of gathering lines and piping to route collected vapors to an existing process operation, existing sales gas system, microturbines, existing fuel gas system, existing gas disposal wells, or existing vapor control devices. The piping would be limited to the boundary of an oil and gas facility, which would have already obtained grading permits, Stormwater Pollution Prevention Plans (SWPPPs), and other regulations as part of the initial construction of initial project development. Installation of piping for vapor collection and control could substantially affect hydrology and water quality, because installation of these features would involve disturbance due to grading, paving, and other necessary construction activities to create the oil or gas facilities. In the case that an existing gas disposal well is used for methane disposal, which is classified as a hazardous material in California, it would be subject to DOGGR and U.S. EPA requirements for Class II wells.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Construction activities and long-term operations associated with reasonably foreseeable compliance responses to the recommended actions in the Scoping Plan Update could be located in a variety of conditions with regards to altering drainage patterns, flooding, and inundation by seiche, tsunami, or mudflow. The level of susceptibility varies by location. The specific design details, siting locations, and associated hydrology and water quality issues are not known at this time and would be analyzed on a site-specific basis at the project level. Therefore, for purposes of CEQA disclosure, these potential hydrology and water quality-related impacts could be significant. Implementation of mitigation measures to reduce these impacts would not reduce these impacts to a less-than-significant level because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update could result in a significant cumulative impact to hydrology and water quality.

The short-term construction-related contribution of the Proposed Regulation to this significant impact would be cumulatively considerable, given the conclusion in Chapter 4 that short-term construction-related activities associated with the Proposed Regulation may result in a significant adverse impact on hydrology and water quality. Implementation of mitigation measures described in Chapter 4 could reduce these impacts to a less-than-significant level; however, the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. As a result, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts. Thus, as a result of short-term construction-related activities, the Proposed Regulation **could result in an unavoidable, cumulatively considerable contribution to a significant cumulative impact to hydrology and water quality**.

Long-term operational activities associated with the Proposed Regulation include the use of gas disposal wells and the removal of sumps (i.e., lined surface impoundments). These activities would be subject to permitting requirements under DOGGR, SRWCB, and BLM as discussed in Chapter 4 of this Draft EA. The long-term operational activities are therefore subject to extensive and rigorous hydrology and water quality-related regulatory and permitting requirements from state and federal agencies. These regulations and permits would prevent surface and subsurface contamination of soil and water, and minimize risks to the environment. Therefore, the Proposed Regulation **would not result in a cumulatively considerable contribution to a significant cumulative impact to hydrology and water quality** related to long-term operational activities.

11. Land Use and Planning

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. The Proposed Regulation would not incentivize or otherwise increase the number of oil and gas facilities in California, but would regulate potential sources of methane leaks into the atmosphere through maintenance, inspection, and upgrade requirements. The Proposed Regulation would not conflict with applicable land use plans, policies, or regulations and it would not result in physical division of an established community.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require both construction and long-term operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. However, facilities would likely occur within the footprints of existing manufacturing facilities, or in areas with zoning that

would permit the development of these facilities. Thus, implementation of the recommended actions would not be anticipated to divide an established community or conflict with a land use or conservation plan. Therefore, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update would not result in a significant cumulative land use planning-related impact.

Implementation of the Proposed Regulation would result in less-than-significant impacts on land use and planning. Oil and gas facilities are usually located in areas zoned for industrial uses; however, wells and equipment may also be located in residential areas or within the boundaries of incorporated cities (e.g., Long Beach, Los Angeles) where local zoning permits. The Proposed Regulation would not incentivize or otherwise increase the number of oil and gas facilities in California, but would regulate potential sources of methane venting and leaks into the atmosphere through maintenance, inspection, and upgrade requirements. The Proposed Regulation would not conflict with applicable land use plans, policies, or regulations and it would not result in physical division of an established community. Therefore the Proposed Regulation **would not result in a cumulatively considerable contribution to a significant cumulative impact on land use and planning**.

12. Mineral Resources

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. Modifications to oil and gas facilities associated with the Proposed Regulation would be limited to covered (i.e., inaccessible to mining activities) or otherwise disturbed areas, and would not affect the availability of a known mineral resource or recovery site.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require both the construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. New facilities would likely occur within existing footprints or in areas with consistent zoning, where original permitting and analyses considered these issues. In addition, some of the recommended actions in the Scoping Plan Update and associated compliance responses could require the extraction of minerals (i.e., lithium or platinum) used to manufacture fuel cell and battery technologies. However, implementation of these measures would not substantially deplete the supply of lithium or platinum and both are currently used in auto manufacturing processes. Therefore, the recommended actions in the Scoping Plan Update would not result in a significant cumulative impact to mineral resources.

Implementation of the Proposed Regulation would result in less-than-significant impacts on mineral resources because modifications to oil and gas facilities associated with the Proposed Regulation would be limited to covered (i.e., inaccessible to mining activities) or otherwise disturbed areas, and would not affect the availability of known mineral resource or recovery sites. Therefore, the Proposed Regulation **would not result in a cumulatively considerable contribution to a significant cumulative impact on mineral resources**.

13. Noise

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. The types of upgrades and modifications to oil and gas facilities that could be required under the Proposed Regulation would be minimal, consisting of activities such as installation of gathering lines and piping, valves, and hatches. New combustion devices would be fully enclosed and would result in negligible noise levels in comparison to the surrounding environments.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operation of new or modified facilities or infrastructure. These activities could result in the generation of short-term construction noise in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors, and exposure to excessive vibration levels, which would be potentially significant. Operational noise impacts would not typically be expected due to the fact that typical compliance response activities would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of these facilities. However, operational effects of equipment constructed as a result of implementation of recommended actions associated with the Scoping Plan Update could result in potentially significant impacts. Implementation of mitigation measures could reduce potential construction-related or operational noise impacts to a less-than-significant level; however, the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, the recommended actions in the Scoping Plan Update could result in a significant cumulative construction-related and operational noise impacts.

Implementation of the Proposed Regulation would result in less-than-significant impacts on noise associated with construction-related activities and increased use of combustion devices. Because construction activities and operation of combustion devices would be limited to discrete project sites, noise levels associated with the Proposed Regulation would not be expected to combine with other noise sources in the

area to create substantial noise levels. Therefore, the Proposed Regulation **would not result in a cumulatively considerable contribution to a significant cumulative impact on noise**.

14. Population and Housing

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. New employment associated with the Proposed Regulation would be minimal and would not result in substantial population growth, displacement of people, or requirements for additional housing.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. These would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of such facilities. Construction of these facilities would require relatively small crews, and demand for these crews would be temporary (e.g., 6 – 12 months per project). Therefore, a substantial amount of construction worker migration would not be likely to occur, and a sufficient construction employment base would likely be available. Construction activities would not require new additional housing or generate changes in land use. Therefore, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update would not result in a significant cumulative impact related to population and housing growth.

Implementation of the Proposed Regulation would result in less-than-significant impacts on population and housing. Because no substantial population growth, displacement of people, or requirements for additional housing would result from implementation of the Proposed Regulation, the Proposed Regulation **would not result in a cumulatively considerable contribution to a significant cumulative impact on population and housing**.

15. Public Services

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. Because activities associated with the Proposed Regulation

would not require new additional housing or substantial population increases, there would be no additional burden on public services anticipated.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could include construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. These would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of these facilities. Construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 – 12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Construction activities would not require new additional housing to accommodate or generate changes in land use and, therefore, would not affect the provision of public services. Therefore, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update would not result in a significant cumulative impact related to public services.

Implementation of the Proposed Regulation would result in less-than-significant impacts on public services. Because activities associated with the Proposed Regulation would not adversely affect public services, the Proposed Regulation **would not result in a cumulatively considerable contribution to a significant cumulative impact on public resources**.

16. Recreation

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. Because activities associated with the Proposed Regulation would not require new additional housing or substantial population increases, there would be no additional burden on recreation resources anticipated.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operations of new or modified facilities or infrastructure. There is uncertainty as to the exact locations of potential new or modified facilities. These activities would likely occur within footprints of existing facilities, or in areas with zoning that would permit their development. In addition, demand for construction of these crews would be temporary (e.g., 6 – 12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction

worker migration would not occur and that a sufficient construction employment base would likely be available. Thus, construction activities associated with reasonably foreseeable compliance responses would not be anticipated to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration would occur. In addition, the demand for new (or expansion of) recreational-related facilities would not occur as a result of construction activities. Therefore, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update would not result in a significant cumulative impact related to recreational facilities.

Implementation of the Proposed Regulation would result in less-than-significant impacts on recreation because there would be no additional burden on recreation resources anticipated. Because no additional recreation facilities would be required, and no deterioration of existing recreation facilities would be expected, the Proposed Regulation **would not result in a cumulatively considerable contribution to a significant cumulative impact on recreation**.

17. Transportation and Traffic

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. Reasonably foreseeable compliance responses associated with the recommended actions in the Proposed Regulation would include increased inspection and monitoring of oil and gas facilities, and installation or replacement of equipment. Some of the potential compliance responses could result in short-term construction traffic (primarily motorized) from worker commute- and material delivery-related trips. The amount of construction activity would vary depending on the particular type, number, and duration of usage for the varying equipment. However, inspections would not occur frequently (i.e., quarterly or annually, depending on the specific equipment) and modifications and repairs to oil and gas facilities would be minor. Thus, the reasonably foreseeable compliance response associated with the Proposed Regulation would not conflict with applicable traffic plans, ordinances, or policy, change air traffic patterns, or alter roadways design.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operations of new or modified facilities or infrastructure. Although detailed information about potential specific construction activities is not currently available, some of the potential compliance responses could result in short-term construction traffic (primarily motorized) from worker commute- and material delivery-related trips. The amount of construction activity would vary depending on the particular type, number, and duration of usage for the varying equipment, and the

phase of construction. These variations would affect the amount of project-generated traffic for both worker commute trips and material deliveries. Depending on the amount of trip generation and the location of new facilities, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. Implementation of mitigation measures could reduce short-term construction related impacts to a less-than-significant level, but because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, the impacts are considered potentially significant and unavoidable. Thus, the Scoping Plan Update EA found that the recommended actions in the Scoping Plan Update could result in a cumulative short-term transportation and traffic-related impact. However the Scoping Plan Update EA found that implementation of the reasonably foreseeable compliance responses under the Scoping Plan Update would not result in cumulative impacts associated with long-term operational changes in traffic patterns or vehicle trips, or conflict with existing circulation plans.

Implementation of the Proposed Regulation would result in less-than-significant impacts on transportation and traffic. As described above in Chapter 4, modifications to existing facilities made in response to the Proposed Regulation would not be extensive and would not require a substantial amount of time or personnel to complete. Operational requirements could be coordinated with existing monitoring requirements in many cases. Even if the operational requirements could not be combined with existing monitoring trips, these trips to and from the oil and gas facilities would not require a substantial number of vehicles and would be infrequent (i.e., quarterly). Because activities associated with the Proposed Regulation would not require new additional housing to accommodate or generate changes in land use, no additional transportation facilities would be required and there would be no changes to emergency access. Therefore, there would be **no cumulatively-considerable contribution to a significant adverse impact to transportation and traffic**.

18. Utility Service Systems

Implementation of the Proposed Regulation would include modifications to existing facilities, such as installation or replacement of gathering lines and piping, flanges, low-NOx combustion devices, tanks, valves, pneumatic devices and pumps, grid detection systems and wellhead sensors, and other similar features already associated with oil and gas facilities. Because activities associated with the Proposed Regulation would not require new additional housing to accommodate or generate changes in land use, no additional utilities and service systems would be required, and no deterioration of existing utility and service systems would be expected.

The Scoping Plan Update includes the reasonably foreseeable compliance responses discussed above under Section 5.A.1. Implementation of reasonably foreseeable

compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operations of new or modified facilities or infrastructure. Newly constructed or modified facilities could generate substantial increases in the demand for water supply, wastewater treatment, storm water drainage, and solid waste services in their local areas. Any new or modified facilities, no matter their size and location would be required to seek local or State land use approvals prior to their development. Part of the land use entitlement process for facilities proposed in California requires that each of these projects undergo environmental review consistent with the requirements of CEQA and the CEQA Guidelines. It is assumed that facilities proposed in other states would be subject to comparable federal, state, and/or local environmental review requirements (e.g., CEQA) and that the environmental review process would assess whether adequate utilities and services (i.e., wastewater services, water supply services, solid waste facilities) would be available and whether the project would result in the need to expand or construct new facilities to serve the project. Implementation of mitigation measures could reduce potential impacts to a less-than-significant level; however, the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, the recommended actions in the Scoping Plan Update could result in a significant cumulative impact on utility service systems.

Implementation of the Proposed Regulation would result in less-than-significant impacts on utilities and service systems. Because there would be no additional utilities and service systems and no deterioration of existing utility and service systems, the Proposed Regulation **would not result in a cumulatively considerable contribution to a significant cumulative impact on utilities and service systems**.

D. Growth-Inducing Impacts

A project would be considered growth-inducing if it removes an obstacle to growth, includes construction of new housing, or establishes major new employment opportunities. The reasonably foreseeable compliance responses associated with the Proposed Regulations would not result in new utility or services systems and would not include construction of new housing.

Implementation of the Proposed Regulation would increase monitoring, reporting, and repair of facilities, which may result in new employment opportunities. Any new jobs created as part of this regulation would not result in a substantial change to the workforce associated with oil and gas, as inspections would generally occur quarterly or annually. In addition, repairs and upgrades associated with requirements under the Proposed Regulations would be minimal and limited to activities such as installation of gathering lines and piping, valves, flanges, pneumatic devices and pumps, and hatches. Thus, it is reasonable to assume that there would be no substantial population growth, displacement of people, or requirements for additional housing. Furthermore, repairs and upgrades to oil and gas facilities would not encourage innovation and would rely on existing technological and mechanical methods to reduce methane and other

emissions. Regulated entities may consider the use of innovative methods of vapor collection processes, wherein a vapor is used to produce energy; however, there are no requirements to develop new vapor disposal practices. Thus, economic activity would not be encouraged as a result of implementation of the Proposed Regulation. Therefore, there would be no growth-inducing effects.

6.0 MANDATORY FINDINGS OF SIGNIFICANCE

Consistent with the requirements of the California Environmental Quality Act (CEQA) Guidelines (Cal. Code Regs., tit. 14, § 15000 et seq) section 15065 and section 18 of the Environmental Checklist, this Draft Environmental Analysis (Draft EA) addresses the mandatory findings of significance for the recommended actions included in the Proposed Greenhouse Gas Emission Controls from Crude Oil & Natural Gas Facilities Regulation (Proposed Regulation).

A. Mandatory Findings of Significance

1. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat for a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?

A finding of significance is required if a project "has the potential to substantially degrade the quality of the environment (Cal. Code Regs., tit. 14, § 15065(a))." In practice, this is the same standard as a significant impact on the environment, which is defined as "a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance (Cal. Code Regs., tit. 14, § 15065(a))."

As with all of the environmental impacts and issue areas, the precise nature and magnitude of impacts would be highly variable, and would depend on a range of reasonably foreseeable compliance responses that could occur with implementation of the recommended actions in the Proposed Regulation. The locations of compliance responses, their spatial or aerial extent, and a variety of site-specific factors are not known at this time but would be addressed by environmental reviews to be conducted when specific regulations are proposed by statewide regulatory agencies, or by local or regional agencies with regulatory authority at the project-specific level.

This Draft EA, in its entirety, addresses and discloses potential environmental impacts associated with the recommended actions in the Proposed Regulation, including direct, indirect, and cumulative impacts in the following resource areas:

- Aesthetics
- Agriculture and Forest Resources
- Air Quality
- Biological Resources
- Cultural Resources

- Energy Demand
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Utilities and Service Systems

As described in Chapter 4, this Draft EA discloses potential environmental impacts, the level of significance prior to mitigation, mitigation measures, and the level of significance after the incorporation of mitigation measures.

a) Impacts on Species

A lead agency must find that a project may have a significant impact on the environment where there is substantial evidence that the project has the potential to (1) substantially reduce the habitat of a fish or wildlife species; (2) cause a fish or wildlife population to drop below self-sustaining levels; or (3) substantially reduce the number or restrict the range of an endangered, rare, or threatened species (Cal. Code Regs., tit. 14, § 15065(a)(1)). Chapter 4 of this Draft EA addresses impacts that could occur to biological resources, including the reduction of fish or wildlife habitat, the reduction of fish or wildlife populations, and the reduction or restriction of the range of special-status species. As described in Chapter 4 of this Draft EA, implementation of the Proposed Regulation could result in short-term construction related impacts on special status species and their sensitive habitat. Mitigation is described in Chapter 4 of this Draft EA that could reduce this impact to a less-than-significant level. However, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts to biological resources associated with the Proposed Regulation would be potentially significant and unavoidable**.** Long-term operational impacts related to the Proposed Regulation would be less-than-significant.

b) Impacts on Historical Resources

A lead agency must find that a project may have a significant impact on the environment where there is substantial evidence that the project has the potential to eliminate important examples of a major period of California history or prehistory (Cal. Code Regs., tit. 14, § 15065(a)(1)). This guidance amplifies PRC section 21001(c) requiring that major periods of California history are preserved for future generations. It also reflects the provisions of PRC section 21084.1 requiring a finding of significance for

substantial adverse changes to historical resources. The CEQA Guidelines establishes standards for determining the significance of impacts to historical resources and archaeological sites that are a historical resource (Cal. Code Regs., tit. 14, § 15064.5).

Chapter 4 of this Draft EA addresses typical construction impacts that could occur related to California history and prehistory, historic resources, archaeological resources, and paleontological resources. As discussed, implementation of mitigation measures could reduce potentially significant impacts to cultural resources, however because the authority to determine specific project-level impacts and mitigation is outside the purview of ARB, any mitigation identified would not reduce these impacts to a less-than-significant level. Thus, the Proposed Regulation could result in a significant impact on cultural resources.

2. Does the project have impacts that are individually limited, but cumulatively considerable?

A lead agency must find that a project may have a significant impact on the environment where there is substantial evidence that the project has potential environmental impacts that are individually limited, but cumulatively considerable (Cal. Code Regs., tit. 14, § 15065). Cumulatively considerable means “that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs., tit. 14, § 15065(a)(3)).” Cumulative impacts are addressed for each of the environmental topics listed above and are provided in Chapter 5, “Cumulative and Growth-Inducing Impacts,” in this Draft EA.

3. Does the project have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly?

A lead agency must find that a project may have a significant impact on the environment where there is substantial evidence that the project has the potential to cause substantial adverse impacts on human beings, either directly or indirectly (Cal. Code Regs., tit. 14, § 15065(a)(4)). Under this standard, a change to the physical environment that might otherwise be minor must be treated as significant if people would be significantly affected. This factor relates to adverse changes to the environment of human beings generally, and not to impacts on particular individuals. While changes to the environment that could indirectly affect human beings would be represented by all of the designated CEQA issue areas, those that could directly affect human beings include air quality, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, population and housing, public services, transportation/traffic, and utilities, which are addressed in Chapter 4 of this Draft EA.

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7.0 ALTERNATIVES ANALYSIS

This chapter of the Draft Environmental Analysis (Draft EA) provides an overview of the regulatory requirements and guidance for alternatives analyses under the California Environmental Quality Act (CEQA), a description of each of the alternatives to the Proposed Regulation for Greenhouse Gas Emission Standards for Crude Oil & Natural Gas Facilities (Proposed Regulation), a discussion of whether and how each alternative meets the objectives of the Proposed Regulation, and an analysis of each alternative's environmental impacts.

A. Approach to Alternatives Analysis

The California Air Resources Board's (ARB) certified regulatory program (Cal. Code Regs., tit. 17, §§ 60000 – 60008) requires that where a contemplated action may have a significant effect on the environment, a staff report shall be prepared in a manner consistent with the environmental protection purposes of ARB's regulatory program and with the goals and policies of CEQA. Among other things, the staff reports must address feasible alternatives to the proposed action that would substantially reduce any significant adverse impact identified.

The certified regulatory program provides general guidance that any action or proposal for which significant adverse environmental impacts have been identified during the review process shall not be approved or adopted as proposed if there are feasible mitigation measures or feasible alternatives available which would substantially reduce such adverse impact. For purposes of this section, "feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors, and consistent with the state Board's legislatively mandated responsibilities and duties (Cal. Code Regs., tit. 17, §60006).

While ARB, by virtue of its certified program, is exempt from Chapters 3 and 4 of CEQA and corresponding sections of the State CEQA Guidelines, the Guidelines nevertheless contain useful information for preparation of a thorough and meaningful alternatives analysis. CEQA Guidelines section 15126.6(a) speaks to evaluation of "a range of reasonable alternatives to the project, or the location of the project, which would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives." The purpose of the alternatives analysis is to determine whether or not a different approaches to or variations of the project would reduce or eliminate significant project impacts, within the basic framework of the objectives, a principle that is consistent with ARB's regulatory requirements.

Alternatives considered in an environmental document should be potentially feasible and should attain most of the basic project objectives. It is, therefore, critical that the

alternatives analysis define the project's objectives. The project objectives are listed below in Section C of this Chapter.

The range of alternatives is governed by the "rule of reason," which requires evaluation of only those alternatives "necessary to permit a reasoned choice." (Cal. Code Regs., tit. 14, §15126.6(f)). Further, an agency "need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (Cal. Code Regs., tit. 14, §15126.6(f)(3)). The analysis should focus on alternatives that are feasible and that take economic, environmental, social, and technological factors into account. Alternatives that are remote or speculative need not be discussed. Furthermore, the alternatives analyzed for a project should focus on reducing or avoiding significant environmental impacts associated with the project as proposed.

B. Selection of Range of Alternatives

This chapter evaluates a reasonable range of alternatives to the Proposed Regulation that could reduce or eliminate the project's significant effects on the environment, while meeting most of the basic project objectives (Cal Code Regs., tit. 14, §15126.6(a)). Pursuant to ARB's certified regulatory program, this chapter also contains an analysis of each alternative's feasibility and the likelihood that it would substantially reduce any significant adverse environmental impacts identified in the impact analysis contained in Chapter 4 of this Draft EA (Cal. Code Regs., tit. 17, §§ 60005(b), and 60006.)

As described earlier, the purpose of the Proposed Regulation is to reduce greenhouse gas (GHG) emissions, primarily methane, from crude oil and natural gas facilities in the following sectors:

- Onshore and offshore crude oil or natural gas production,
- Crude oil, condensate and produced water separation and storage;
- Natural gas gathering and boosting stations;
- Natural gas processing plants;
- Natural gas transmission compressor stations; and,
- Natural gas underground storage.

The Proposed Regulation is designed to ensure that California remains on track to meet the near-term 2020 GHG emissions limit and continues on a downward GHG emissions trajectory consistent with achieving the State's long-term climate stabilization objectives, while maintaining a vibrant, clean, and sustainable California economy.

ARB has identified a reasonable range of three alternatives that allow the public and Board to understand the differences between different approaches. In addition to the No Project Alternative, ARB made a good faith effort to identify other potentially feasible project alternatives. This included examining comments received at the public

workshops held on August 25, 2014, December 9, 2014, April 27, 2015, and April 29, 2015, and the final version of this document will contain comments received at the board hearing held on July 21, 2016, to determine if any commenters suggested potentially feasible alternatives. ARB staff found no comments suggesting an alternative comprehensive approach to meet the State's long-term goals.

For the purposes of this analysis, three alternatives are considered:

1. No Project Alternative;
2. No Enhanced Monitoring at Natural Gas Underground Storage Facilities Alternative; and
3. No Vapor Collection System Alternative

A description of these alternatives, their ability to meet the project objectives, and a brief consideration of their environmental impacts, compared to the Proposed Regulation, is described below.

C. Objectives

Recognizing the requirements of AB 32 to reduce GHG emissions, the need for California to attain the National and State ambient air quality standards for criteria air pollutants and to reduce exposure to toxic air contaminants (TAC), the primary objectives of the Proposed Regulation include the following:

1. Control vented and fugitive methane emissions from new and existing onshore and offshore crude oil or natural gas production; crude oil, condensate and produced water separation and storage; natural gas gathering and boosting stations; natural gas processing plants; natural gas transmission compressor stations; and, natural gas underground storage.
2. Promote statewide uniformity of methane emission controls for crude oil and natural gas facilities by promulgating a statewide regulation;
3. Achieve reductions of VOC and TACs related to oil and gas production and well stimulation, as a co-benefit through these control strategies;
4. Use control strategies that complement, are consistent with, or are based, in part, on U.S. EPA New Source Performance Standards (NSPS) for the Oil and Natural Gas Industry, specifically 40 Code of Federal Regulations Part 60 Subpart OOOO, and other applicable federal and State regulations;
5. Develop a regulation that is consistent with and meets the goals of The First Update to the Scoping Plan[20] and which can support the draft Short Lived Climate Pollutant Plan[21].

[20] http://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm

6. Achieve emission reductions that are real, additional, permanent, quantifiable, verifiable and enforceable;
7. Maintain and continue reductions in emissions of GHG beyond 2020, in accordance with AB 32 (*See, e.g.*, Health & Saf. Code, § 38551(b), 38562); pursue measures that implement reduction strategies covering the State's GHG emissions in furtherance of California's mandate to reduce GHG emissions to 1990 levels by 2020;
8. Achieve maximum technologically feasible and cost-effective reductions in furtherance of achieving the statewide GHG emissions limit (Health & Saf. Code, § 38562(a));
9. Ensure that the regulation achieves the additional substantive requirements of AB 32 (Health & Saf. Code § 38562(b) and (d)), including:

   9(a). That activities undertaken pursuant to the Proposed Regulation complement, and do not interfere with, efforts to achieve and maintain national and California Air Quality Attainment Standards and to reduce TAC emissions (Health & Saf. Code, § 38562(b)(4));

9(b). Ensure that activities undertaken pursuant to the Proposed Regulation do not disproportionately impact low-income communities (Health & Saf. Code, § 38562(b)(2);

9(c). Minimize, to the extent feasible, the administrative burden of implementing and complying with the Proposed Regulation (Health & Saf. Code, § 38562(b)(7));

9(d) Maximize, to the extent feasible, additional environmental and economic benefits for California, as appropriate (Health & Saf. Code, § 38570(b)(3)); and

10. To the extent feasible, ensure that oil and natural gas providers are not required to meet duplicative or inconsistent regulatory requirements (Health & Saf. Code, § 38501(g), and 38561(a)).

D. Description of Alternatives

Detailed descriptions of each alternative are presented below. The analysis that follows the descriptions of the alternatives includes a discussion of the degree to which each alternative meets the basic project objectives, the degree to which each alternative avoids potentially significant impacts identified in Chapter 4, and any environmental impacts that may result from the alternative.

[21] http://www.arb.ca.gov/cc/shortlived/shortlived.htm

1. Alternative 1: No-Project Alternative

ARB is including Alternative 1, the No-Project Alternative, to provide a good faith effort to disclose environmental information that is important for considering the Proposed Regulation. ARB's certified regulatory program does not mandate consideration of a "No-Project Alternative." (Cal. Code Regs., tit. 17, §60006). Under ARB's certified regulatory program, the alternatives considered, among other things, must be "consistent with the state board's legislatively mandated responsibilities and duties" (Cal Code. Regs., tit. 17, §60006).

The No-Project Alternative is included to assist in the analysis and consideration of the Proposed Regulation and the action alternatives. It is useful to include a "No-Project Alternative" in this analysis for the same reasons that this type of alternative is called for in CEQA. As noted in CEQA, "the purpose of describing and analyzing a no-project alternative is to allow decision-makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project." (Cal. Code Regs., tit. 14, § 15126.6, subd. (e)(1).) The No-Project Alternative also provides an important point of comparison to understand the potential environmental benefits and impacts of the other alternatives.

Under this No-Project Alternative, oil and gas facilities would maintain their current operations and maintenance activities. No specific set of actions would be required to reduce methane emissions from oil and gas facilities. There would be no requirements to install vapor collection systems, maintain reciprocating compressors, replace or retrofit centrifugal compressor seals, replace or retrofit gas-powered pneumatic devices and pumps, establish leak detection and repair programs for methane, or to do the other actions associated with the Proposed Regulation.

Under implementation of the No-Project Alternative, the air quality and GHG emission benefits associated with the Proposed Regulation would not occur. Therefore, this alternative would not meet the objectives associated with the Proposed Regulation to reduce methane, and, as co-benefits, secure reductions (or avoid significant increases of) criteria air pollutants, VOCs, and TACs and would not be consistent with the goals of the First Update to the Scoping Plan or the Proposed Short Lived Climate Pollutant Plan. Nor does the No Project Alternative support ARB's compliance with its legislative mandates to regulate to reduce greenhouse gas emissions to support the goals of AB 32, which include securing continued greenhouse gas reductions and ensuring that the statewide greenhouse gas limit is maintained (*See, e.g.*, Health & Saf. Code § 38551, 38560, 38562). Accordingly, alternatives that do not achieve these mandates are inconsistent with ARB's legislative direction. However, the No-Project Alternative would eliminate short-term construction-related impacts to biological resources, geology and soil, cultural resources impacts, and hydrology and water quality, associated with installation of destructive or non-destructive equipment or gathering lines and piping, respectively, related to vapor collection systems. While oil and gas facility operators

could decide to install these devices regardless of ARB's action on the Proposed Regulation, it would not be due to ARB's regulatory authority.

2. Alternative 2: No Enhanced Monitoring at Natural Gas Underground Storage Facilities

Alternative 2 is to propose no enhanced monitoring at natural gas underground storage facilities. This removes the requirement to monitor ambient air at the facility and to screen each well and the surrounding areas daily. There would be no alternative compliance responses; operators of natural gas underground storage facilities would be required to comply with the other provisions of the Proposed Regulation. This alternative is included to specifically address the impacts associated with short-term construction related activities, such as ground disturbance.

This Alternative would result in no impacts from installation of ambient air monitors or installation of a grid gas detection system or wellhead sensors. This Alternative would therefore reduce the Proposed Regulation's earth-moving activities. The short-term construction related impacts for biological resources, cultural resources, geology and soils, and water quality and hydrology associated with the Proposed Regulation would not occur at natural gas underground storage facilities. Impacts associated with the remaining resources topics (i.e., topics other than biological resources, cultural resources, geology and soils, and hydrology and water quality) would be similar to those discussed for the Proposed Regulation.

Alternative 2 would meet most of the project objectives associated with reductions in methane emissions and achieving co-benefit pollutant reductions (or avoiding significant increases of these pollutants). It would also generally be consistent with complementary strategies, including the Scoping Plan. Emissions would be reduced, and continue to be reduced beyond 2020. Low-income communities would not be disproportionately impacted by this alternative. However, this Alternative would not achieve the early detection of leaks or failure and may result in methane super emitters going undetected. This Alternative would not be capable of meeting the objectives of the regulation to limit fugitive and vented emissions from natural gas underground storage facilities and does not fully support the Proposed Short-Lived Climate Pollutant Reduction Strategy.

3. Alternative 3: No Vapor Collection System Alternative

Alternative 3 is to propose no vapor collection systems.This removes the option to collect and pipe vapors to an existing sales gas system, microturbines, fuel gas system, existing gas disposal well, an existing vapor control device, or new destructive or non-destructive vapor control device. Compliance responses would be limited primarily to removing from service all equipment that exceeds the standards established in the Proposed Regulation; replacement of pneumatics reciprocating compressor rod packing seals, and centrifugal compressor wet seals; or LDAR activities. For example, compliance options for tanks would be limited to flash analysis testing of the tank and

removal of the tank if the results exceed the emission rate thresholds established in the Proposed Regulation. Circulation tanks would be required to comply with the LDAR requirements of the Proposed Regulation and if the LDAR standard was exceeded, operations that required use of the circulation tank could not continue. This Alternative would likely result in the closure of potentially large portions of oil and gas operations.

This Alternative would result in no impacts from installation of a vapor collection system or use of a destructive vapor control device. This Alternative would substantially reduce the earth-moving activities. The short-term construction related impacts for biological resources, cultural resources, geology and soils, and water quality and hydrology associated with the Proposed Regulation would not occur at most facilities; however, underground natural gas storage facilities would still be required to comply with the enhanced monitoring provisions. Impacts associated with the remaining resources topics (i.e., topics other than biological resources, cultural resources, geology and soils, and hydrology and water quality) would be similar to those discussed for the Proposed Regulation.

Alternative 3 would meet most of the project objectives associated with reductions in methane emissions and achieving co-benefit pollutant reductions (or avoiding significant increases of these pollutants). It would also generally be consistent with complementary strategies, including the Scoping Plan and Proposed Short-Lived Climate Pollutant Reduction Strategy. Emissions would be reduced, and continue to be reduced beyond 2020. Low-income communities would not be disproportionately impacted by this alternative. This Alternative would, however, not be capable of fully meeting the objectives of the regulation to achieve technologically feasible, cost-effective emission reductions that achieve, to the extent feasible, additional economic benefits for California. This is because it would not take advantage of cost-effective low-emitting combustion technologies and instead require closures of more facilities. Accordingly, this alternative would achieve emission reductions but at higher costs.

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8.0 REFERENCES

1. Air Resources Board (ARB). 2009. Oil and Gas Survey ARB 2007 Oil and Gas Industry Survey Results, Final Report, revised in October 2013. (CD: EA/01 ARB 2009)

2. CCST. 2015 (January). An Independent Scientific Assessment of Well Stimulation in California. Volume 2, Chapter 4. Available: https://ccst.us/publications/2015/vol-II-chapter-4.pdf . Accessed: April 2016. (CD: EA/02 CCTS 2014)

3. DOGGR. 2016. General information – Oil, Gas & Geothermal – Injection Wells. Available: http://www.conservation.ca.gov/dog/general_information/Pages/class_injection_wells.aspx. Accessed: April 2016. (CD: EA/03 DOGGR 2016)

4. DOGGR. 2015. Draft Environmental Impact Report. Analysis of Oil and Gas Well Stimulation Treatments in California. Available: ftp://ftp.consrv.ca.gov/pub/oil/SB4DEIR/EIR/SB4_DEIR_Vol1.pdf Accessed: April 2016. (CD: EA/04 DOGGR 2015)

5. Schlumberger. 2015. Oilfield Glossary. Available: http://www.glossary.oilfield.slb.com/en/Terms.aspx?LookIn=term%20name&filter=proppant. Accessed: April 2016. (CD: EA/05 Schlumberger 2015)

6. Tribal Energy and Environmental Information. 2014. Oil and Gas Drilling/Development Impacts. Available: http://teeic.indianaffairs.gov/er/oilgas/impact/drilldev/index.htm. Accessed: April 2016. (CD: EA/06 Tribal Energy and Environmental Info 2014)

7. EIA. 2008. About U.S. Natural Gas Pipelines – Transporting Natural Gas. Available: https://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/undrgrnd_storage.html#western. Accessed: April 2016. (CD: EA/07 EIA 2008)

8. EIA. 2014a. California State Profile and Energy Estimates. Overview. Available: http://www.eia.gov/state/?sid=CA. Accessed: April 2016. (CD: EA/08 EIA 2014a)

9. EIA. 2014b. California State Profile and Energy Estimates. Profile Analysis. Available: http://www.eia.gov/state/analysis.cfm?sid=CA
(CD: EA/09 EIA 2014b)

10. EIA. 2015. Underground Natural Gas Storage Capacity. Available: http://www.eia.gov/dnav/ng/ng_stor_cap_dcu_SCA_a.htm. Accessed: April 2016.
(CD: EA/10 EIA 2015)

11. Rubinstein, Justin L. and Alireza Babaie Mahani. 2015. "Myths and Facts on Wastewater Injection, Hydraulic Fracturing, Enhanced Oil Recovery, and Induced Seismicity." Seismological Research Letters 86, no. 4.
(CD: EA/11 Rubinstein 2015)

12. SJVAPCD. 2016. Update to the SJVUAPCD Governing Board. Item Number 9: Discuss and Provide Direction Regarding Local Implementation of State Air Resources Board's Proposed Oil and Gas Greenhouse Gas Reduction Regulation. May 4, 2016.
(CD: EA/12 SJVAPCD 2016)

13. U.S. EPA. 2003. Installing Vapor Recovery Units on Crude Oil Storage Tanks. Available: http://nepis.epa.gov/Exe/ZyPDF.cgi/P1004FDH.PDF?Dockey=P1004FDH.PDF. Accessed: April 2016.
(CD: EA/13 US EPA 2003)

14. U.S. EPA. 2014a. Oil and Natural Gas Sector Compressors. Available: http://www.epa.gov/airquality/oilandgas/2014papers/20140415compressors.pdf. Accessed: April 2016.
(CD: EA/14 US EPA 2014a)

15. U.S. EPA. 2014b. Oil and Natural Gas Sector Pneumatic Devices. Available: http://www.epa.gov/airquality/oilandgas/2014papers/20140415pneumatic.pdf. Accessed: April 2016.
(CD: EA/15 US EPA 2014b)

16. U.S. EPA. 2006. Installing Plunger Lift Systems in Gas Wells. Available: http://www.epa.gov/gasstar/documents/ll_plungerlift.pdf. Accessed: April 2016.
(CD: EA/16 US EPA 2006)

17. USGS. 1988. Petroleum Systems of the United States. USGS Survey Bulletin 1870. Available: http://pubs.usgs.gov/bul/1870/report.pdf. Accessed: April 2016.
(CD: EA/17 USGS 1988)

18. USGS. 2015. Induced Earthquakes. Available: http://earthquake.usgs.gov/research/induced/. Accessed: April 2016.
(CD: EA/18 USGS 2015)

19. Veil, John. 2013. "A White Paper Summarizing a Special Session on Induced Seismicity." Ground Water Research & Education Foundation Spotlight Series. (CD: EA/19 Veil 2013)

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ATTACHMENT 1:

ENVIRONMENTAL AND REGULATORY SETTING

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1.0 AESTHETICS

Existing Conditions

California, by virtue of its size, setting, and topographic and climate variation, exhibits tremendous scenic diversity. The varied landscape ranges from coastal to desert and valley to mountain. Innumerable natural features and settings combine to produce scenic resources that are treasured by residents and visitors alike.

Oil and natural gas production, processing and storage operations occur in oil and natural gas production fields. These operations primarily occur within existing field production operations, however new field operations may be developed in the future. The affected environment for oil and natural gas field operations consist of a grouping of leveled drill pads and immediate vicinity and the area from within which the operation is visible. The pad and immediate vicinity typically include the well heads and pipes, roads, and pumps, ponds, or tanks required to support the production and collection of hydrocarbons.

Regulatory Setting

Table 1 describes the applicable laws and regulations for aesthetics and scenic resources associated with the Proposed Regulation.

Table 1: Applicable Laws and Regulations for Aesthetic Resources

Applicable Regulations	Description
Federal	
Federal Land Policy and Management Act of 1976 (FLPMA)	FLPMA is the enabling legislation establishing the Bureau of Land Management's responsibilities for lands under its jurisdiction. Section 102 (a) of the FLPMA states that "…the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archeological values…" Section 103(c) identifies "scenic values" as one of the resources for which public land should be managed.
Bureau of Land Management (BLM) Contrast Rating System	The contrast rating system is a systematic process used by BLM to analyze visual impacts of proposed projects and activities. It is primarily intended to assist BLM personnel in the resolution of visual impact assessment.
Natural Historic Preservation Act (NHPA)	Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property's "setting … [or] … feeling" in a way that affects the property's eligibility for listing may result in a potentially significant adverse effect. "Examples of adverse effects … include…: Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features."

Table 1: Applicable Laws and Regulations for Aesthetic Resources	
Applicable Regulations	**Description**
	(36 CFR Part 800.5)
National Scenic Byways Program	Title 23, Sec 162 outlines the National Scenic Byways Program. This program is used to recognize roads having outstanding scenic, historic, cultural, natural, recreational, and archaeological qualities through designation of road as: National Scenic Byways; All-American Roads; or America's Byways. Designation of the byways provides eligibility for Federal assistance for safety improvement, corridor management plans, recreation access, or other project that protect scenic, historical, recreational, cultural, natural, and archaeological resources.
State	
Ambient Air Quality Standard for Visibility-Reducing Particles	Extinction coefficient (measure of absorption of light in a medium) of 0.23 per kilometer — visibility of ten miles or more (0.07 - 30 miles or more for Lake Tahoe) — due to particles when relative humidity is less than 70 percent.
California Streets and Highway Code, Section 260 through 263 – Scenic Highways	The State Scenic Highway Program promotes protection of designated State scenic highways through certification and adoption of local scenic corridor protection programs that conform to requirements of the California Scenic Highway Program.
California Coastal Act, Section 30251	Under Section 30251 of the California Coastal Act, the scenic qualities of coastal areas must be considered and protected in the development process. Permitted development must be located and designed so as to protect the scenic and visual qualities of coastal areas including protecting views to and along the ocean and scenic coastal areas, matching the visual character of surrounding areas, and, where feasible, restoring and enhancing visual quality in visually degraded areas.
Local	
County and City Controls	Most local planning guidelines to preserve and enhance the visual quality and aesthetic resources of urban and natural areas are established in the jurisdiction's General Plan. The value attributed to a visual resource generally is based on the characteristics and distinctiveness of the resource and the number of persons who view it. Vistas of undisturbed natural areas, unique or unusual features forming an important or dominant portion of a viewshed, and distant vistas offering relief from less attractive nearby features are frequently considered to be scenic resources. In some instances, a case-by-case determination of scenic value may be needed, but often there is agreement within the relevant community about which features are valued as scenic resources. In addition to federal and State designations, counties and cities have their own scenic highway designations, which are intended to preserve and enhance

Table 1: Applicable Laws and Regulations for Aesthetic Resources	
Applicable Regulations	**Description**
	existing scenic resources. Criteria for designation are commonly included in the conservation/open space element of the city or County General Plan.

2.0 AGRICULTURAL AND FOREST RESOURCES

Existing Conditions

The California Department of Conservation's (DOC's) Farmland Mapping and Monitoring Program (FMMP) inventories agricultural resources based on soil quality and land use within California. The Farmland Mapping and Monitoring Program uses the following definitions to describe farmland types.

- Prime Farmland is defined by the DOC as "Land with the best combination of physical and chemical features able to sustain long term production of agricultural crops. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for production of irrigated crops at some time during the past four years."
- Farmland of Statewide Importance is defined by the DOC as "Land similar to Prime Farmland that has a good combination of physical and chemical characteristics for the production of agricultural crops. This land has minor shortcomings, such as greater slopes or less ability to store soil moisture than Prime Farmland. Land must have been used for production of irrigated crops at some time during the past four years."
- Unique Farmland is defined by the DOC as "Lesser quality soils used for the production of the State's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyard as found in some climatic zones in California."

As of 2010, of California's approximately 100 million acre of land, 31.5 million acres are used for agriculture. Of this, 19.2 million acres are grazing land and 12.2 million acres are cropland. Farmland considered to be prime, unique or of statewide importance covers 9.1 million acres (DOC 2013). California has been the top agricultural producer of all states in the U.S. for approximately 50 years. The California Department of Conservation determined that farm and grazing land decreased by more than 1.3 million acres between 1984 and 2010. Conversion to urban land contributes more than 1.08 million acres over this time period (DOC 2014).

Of the 85 million acres of wildlands in California, nearly 17 million are commercial forest land, half privately-owned and half government-owned. Forest land grows 3.8 billion board feet annually. Approximately 2 billion board feet of timber is harvested per year (Calfire 2016). State wildlands also provide valuable watershed, wildlife habitat, and recreation resources. State definitions of “forest land” and “timberland” are defined in California Public Resources Code.

- Forest land is “land that can support, under natural conditions, 10 percent native tree cover of any species, including hardwoods, and that allows for the preservation or management of forest-related resources such as timber, aesthetic value, fish and wildlife, biodiversity, water quality, recreational facilities, and other public benefits” (California Public Resources Code Section 12220(g)).
- Timberland is defined “Land, other than land owned by the federal government and land designated by the board as experimental forest land, which is available for, and capable of, growing a crop of trees of any commercial species used to produce lumber and other forest products, including Christmas trees.” (California Public Resources Code Section 4526)

Regulatory Setting

Table 2 describes the applicable laws and regulations for agricultural and forest resources associated with the Proposed Regulation.

Table 2: Applicable Laws and Regulations for Agriculture and Forest Resources

Applicable Regulations	Description
Federal	
Farmland Protection Policy Act (FPPA)	FPPA directs federal agencies to consider the effects of federal programs or activities on farmland, and ensure that such programs, to the extent practicable, are compatible with state, local and private farmland protection programs and policies. FPPA is intended to “minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses.”
National Forest Management Act (NFMA) of 1976	NFMA is the primary statute governing the administration of national forests. The act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. Goal 4 of the U.S. Forest Service’s National Strategic Plan for the National Forests states that the nation’s forests and grasslands play a significant role in meeting America’s need for producing and transmitting energy. Unless otherwise restricted, National Forest Service lands are available for energy exploration, development,

Table 2: Applicable Laws and Regulations for Agriculture and Forest Resources	
Applicable Regulations	**Description**
	and infrastructure (e.g., well sites, pipelines, and transmission lines). However, the emphasis on non-recreational special uses, such as utility corridors, is to authorize the special uses only when they cannot be reasonably accommodated on non-National Forest Service lands.
State	
The California Land Conservation Act, also known as the Williamson Act (Government Code Section 51200)	The DOC's Division of Land Resource Protection administers the Williamson Act program, which permits property tax adjustments for landowners who contract with a city or county to keep their land in agricultural production or approved open space uses for at least 10 years. Lands covered by Williamson Act contracts are assessed on the basis of their agricultural value instead of their potential market value under nonagricultural uses. In return for the preferential tax rate, the landowner is required to contractually agree to not develop the land for a period of at least 10 years. Williamson Act contracts are renewed annually for 10 years unless a party to the contract files for nonrenewal. The filing of a non-renewal application by a landowner ends the automatic annual extension of a contract and starts a 9-year phase-out of the contract. During the phase-out period, the land remains restricted to agricultural and open-space uses, but property taxes gradually return to levels associated with the market value of the land. At the end of the 9-year non-renewal process, the contract expires and the owner's uses of the land are restricted only by applicable local zoning. The Williamson Act defines compatible use of contracted lands as any use determined by the county or city administering the agricultural preserve to be compatible with the agricultural, recreational, or open space use of land within the preserve and subject to contract (Government Code, Section 51202[e]). However, uses deemed compatible by a county or city government must be consistent with the principles of compatibility set forth in Government Code, Section 51238.1. Approximately 16 million acres of farmland (about 50 percent of the State's total farmland) are enrolled in the program.
California Farmland Conservancy Program (CFCP) (Public Resources Code [PRC] Section 10200)	The program provides grant funding for agricultural conservation easements. Although the easements are always written to reflect the benefits of multiple resource values, there is a provision in the CFCP statute that prevents easements funded under the program from restricting husbandry practices. This provision could prevent restricting those practices to benefit other natural resources.
Farmland Mapping and Monitoring Program (FMMP) (Government	Under the FMMP, the California DOC assesses the location, quality, and quantity of agricultural lands and conversion of these lands over time. Agricultural designations include the categories of Prime

Table 2: Applicable Laws and Regulations for Agriculture and Forest Resources	
Applicable Regulations	**Description**
Code Section 65570, PRC Section 612)	Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban and Built-Up Land, and Other Land.
State Lands Commission Significant Land Inventory	The State Lands Commission is responsible for managing lands owned by the State, including lands that the State has received from the federal government. These lands total more than four million acres and include tide and submerged lands, swamp and overflow lands, the beds of navigable waterways, and State School Lands. The State Lands Commission has a legal responsibility for, and a strong interest in, protecting the ecological and Public Trust values associated with the State's sovereign lands, including the use of these lands for habitat preservation, open space and recreation. Scoping Plan projects located within these lands would be subject to the State Lands Commission permitting process.
Forest Taxation Reform Act of 1976 and California Timberland Productivity Act of 1982	Under the Forest Taxation Reform Act of 1976 and California Timberland Productivity Act of 1982, Timberland Production Zones replaced the use of Williamson Act contracts on timberland. Within designated Timberland Production Zones, land use is restricted to timber harvesting and compatible uses for rolling 10 year terms.
Local	
Open Space Element	State law requires each city and county to adopt a general plan containing at least seven mandatory elements including an open space element. The open space element identifies open space resources in the community and strategies for protection and preservation of these resources. Agricultural and forested lands are among the land use types identified as open space in general plans.
"Right-to-farm" ordinances	Many local jurisdictions (county and city) have "right-to-farm" ordinances which seek to reduce the opposition of urban neighbors to commercial agriculture as a nuisance generator
Zoning	The city or county zoning code is the set of detailed requirements that implement the general plan policies at the level of the individual parcel. The zoning code presents standards for different land uses and identifies which land uses (e.g., agriculture, residential, commercial, industrial) are allowed in the various zoning districts of the jurisdiction. Since 1971, state law has required the city or county zoning code to be consistent with the jurisdiction's general plan, except in charter cities.

3.0 AIR QUALITY

Existing Conditions

Federal, State, and local governments all share responsibility for reducing air pollution. ARB is California's lead air agency and controls emissions from mobile sources, fuels, and consumer products, as well as air toxics. ARB also coordinates local and regional emission reduction measures and plans that meet federal and State air quality limits. At the federal level, the U.S. EPA has oversight of State programs. In addition, U.S. EPA alone establishes emission standards for certain mobile sources such as ships, trains, and airplanes.

Criteria Air Pollutants

Concentrations of emissions of criteria air pollutants (CAPs) are used to indicate the quality of the ambient air because these are the most prevalent air pollutants known to be harmful to human health. A brief description, including emissions sources and health effects, of each CAP is summarized in Table 3.

Table 3: Sources and Health Effects of Criteria Air Pollutants

Pollutant	Sources	Acute[1] Health Effects	Chronic[2] Health Effects
Ozone	Secondary pollutant resulting from reaction of reactive organic gases (ROG) and oxides of nitrogen (NO_X) in presence of sunlight. ROG emissions result from incomplete combustion and evaporation of chemical solvents and fuels; NO_X results from the combustion of fuels	Increased respiration and pulmonary resistance; cough, pain, shortness of breath, lung inflammation	Permeability of respiratory epithelia, possibility of permanent lung impairment
Carbon monoxide (CO)	Incomplete combustion of fuels; motor vehicle exhaust	Headache, dizziness, fatigue, nausea, vomiting, death	Permanent heart and brain damage
Nitrogen dioxide (NO_2)	Combustion devices; e.g., boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines	Coughing, difficulty breathing, vomiting, headache, eye irritation, chemical pneumonitis or pulmonary edema; breathing abnormalities, cough, cyanosis, chest	Chronic bronchitis, decreased lung function

Table 3: Sources and Health Effects of Criteria Air Pollutants			
Pollutant	**Sources**	**Acute[1] Health Effects**	**Chronic[2] Health Effects**
		pain, rapid heartbeat, death	
Sulfur dioxide (SO_2)	Coal and oil combustion, steel mills, refineries, and pulp and paper mills	Irritation of upper respiratory tract, increased asthma symptoms	Insufficient evidence linking SO_2 exposure to chronic health impacts
Respirable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$)	Fugitive dust, soot, smoke, mobile and stationary sources, construction, fires and natural windblown dust, and formation in The atmosphere by condensation and/or transformation of SO_2 and ROG	Breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, premature Death	Alterations to the immune system, carcinogenesis
Lead	Metal processing	Reproductive/ developmental effects (fetuses and children)	Numerous effects including neurological, endocrine, and cardiovascular effects

[1] Acute" refers to effects of short-term exposures to criteria air pollutants, usually at relatively high concentrations.
[2] Chronic" refers to effects of long-term exposures to criteria air pollutants, even at relatively low concentrations.
Sources: EPA 2011.

Ozone

Ozone is a photochemical oxidant (a substance whose oxygen combines chemically with another substance in the presence of sunlight) and the primary component of smog. Ozone is not directly emitted into the air but is formed through complex chemical reactions between precursor emissions of reactive organic gases (ROG) and oxides of nitrogen (NO_X) in the presence of sunlight. ROG are volatile organic compounds that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that result from the combustion of fuels.

Emissions of the ozone precursors ROG and NO_X have decreased over the past several years because of more stringent motor vehicle standards and cleaner burning

fuels. During the last 20 years the maximum amount of ROG and NO_X over an 8-hour period decreased by 17 percent. However, most counties in California are in nonattainment for ozone.

Nitrogen Dioxide

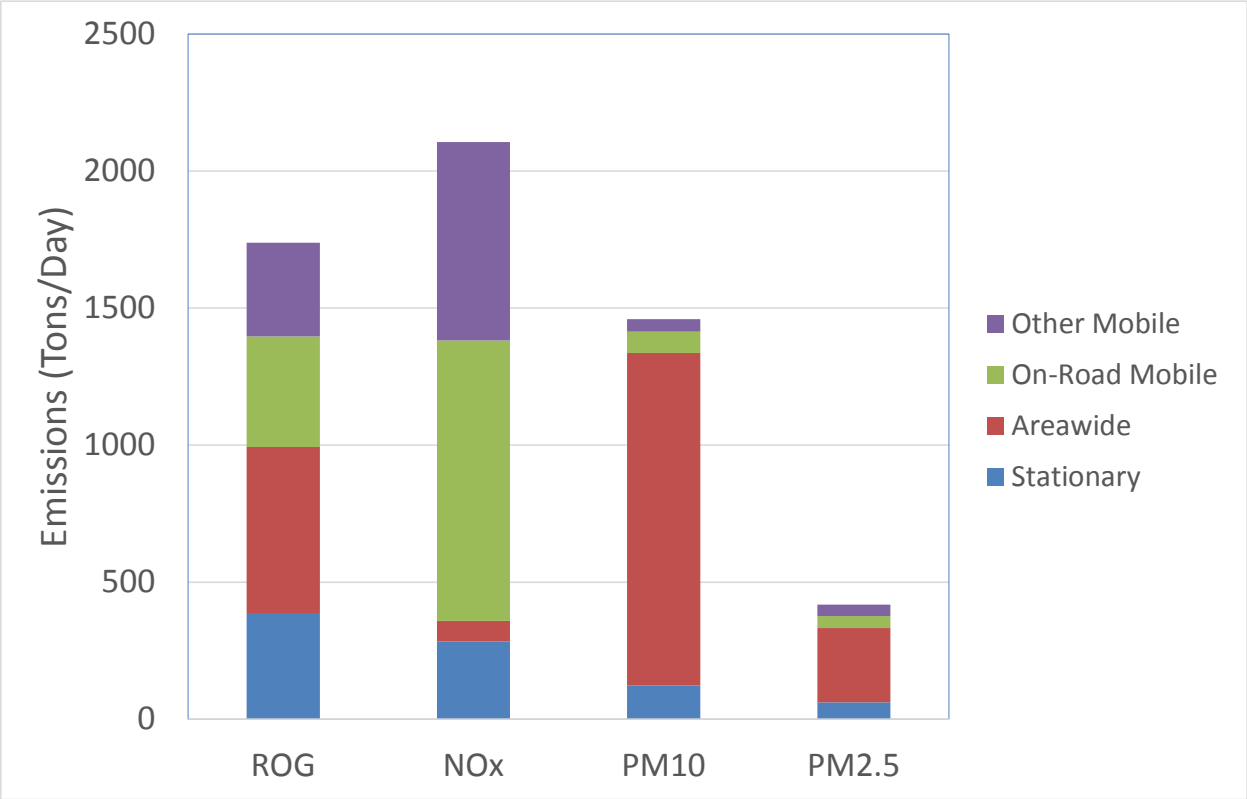
NO_2 is a brownish, highly-reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2. The combined emissions of NO and NO_2 are referred to as NO_X and are reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a particular geographical area may not be representative of the local sources of NO_X emissions (EPA 2011a).

Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction equipment, fires and natural windblown dust, and particulate matter formed in the atmosphere by reaction of gaseous precursors (ARB 2009). $PM_{2.5}$ includes a subgroup of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less. PM_{10} emissions in California are dominated by emissions from area sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, farming operations, construction and demolition, and particles from residential fuel combustion. Direct emissions of PM_{10} have increased slightly in California over the last 20 years, and are projected to continue. $PM_{2.5}$ emissions have remained relatively steady over the last 20 years and are projected to increase slightly through 2020. Emissions of $PM_{2.5}$ are dominated by the same sources as emissions of PM_{10} (ARB 2009).

Emissions Inventory

Figure 1 summarizes emissions of CAPs within California for various source categories. According to California's emissions inventory, mobile sources are the largest contributor to the estimated annual average for air pollutant levels of ROG and NO_X accounting for approximately 51 percent and 86 percent respectively, of the total emissions. Area wide sources account for approximately 89 percent and 73 percent of California's PM_{10} and $PM_{2.5}$ emissions, respectively (ARB 2013a).



Source: ARB 2013a
Exhibit 1 California 2012 Emissions Inventory

Toxic Air Contaminants

Concentrations of toxic air contaminants (TACs) are also used to indicate the quality of ambient air. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

According to the *California Almanac of Emissions and Air Quality* (ARB 2009), the majority of the estimated health risks from TACs can be attributed to relatively few compounds, the most predominant being particulate-exhaust emissions from diesel-fueled engines (diesel PM). In addition to diesel PM, the TACs for which data are available that pose the greatest existing ambient risk in California are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, paradichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene.

Diesel PM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emissions control system is being used. Unlike some TACs, no ambient monitoring data

are available for diesel PM because no routine measurement method currently exists. However, ARB has made preliminary concentration estimates based on a PM exposure method. This method uses the ARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data, and the results from several studies to estimate concentrations of diesel PM.

Diesel PM poses the greatest health risk among these 10 TACs mentioned Since 1990, the health risk associated with diesel PM has been in California has reduced by 52 percent. Overall, levels of most TACs, except paradichlorobenzene and formaldehyde, have decreased since 1990 (ARB 2009).

Regulatory Setting

Table 4 describes the applicable laws and regulations for air quality associated with the Proposed Regulation.

Table 4: Applicable Laws and Regulations for Air Quality

Regulation	Description
Federal	
Clean Air Act (CAA) (40 CFR)	CAA, which was last amended in 1990, requires U.S. EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of NAAQS. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. U.S. EPA Office of Air Quality Planning and Standards (OAQPS) has set NAAQS for six principal pollutants, which are called "criteria" pollutants. CAA Section 160-169A and implementing regulations (Title 42 USC Section 7470-7491, 40 CFR 51 & 52) require prevention of significant deterioration (PSD) review and facility permitting for construction of new or modified major stationary sources of pollutants that occur at ambient concentrations attaining the NAAQS. CAA Section 171-193 and implementing regulations (42 USC Section 7501 et seq., 40 CFR 51 Appendix S) requires new source review (NSR) facility permitting for construction or modification of specified stationary sources. CAA Section 501 and implementing regulations (42 USC Section 7661, 40 CFR 70) establishes federal operating permit program for major stationary sources, known as Title V permits.

Table 4: Applicable Laws and Regulations for Air Quality	
Regulation	**Description**
U.S. EPA Emission Standards	U.S. EPA establishes and maintains emission standards of performance for new stationary sources under CAA Section 111(b), as the New Source Performance Standards (NSPS). NSPS relating to oil and natural gas operations include: Subpart OOOO (40 CFR 60): Crude Oil and Natural Gas Production, Transmission and Distribution, including the Oil and Natural Gas Sector for New Hydraulically Fractured Wells (drilled after August 23, 2011); Subpart Kb: Volatile Organic Liquid Storage Vessels.; Subpart KKK: Equipment Leaks of VOC From Onshore Natural Gas Processing Plants; Subpart LLL: SO_2 Emissions From Onshore Natural Gas Processing; Subpart IIII & JJJJ: Stationary Compression Ignition & Spark Ignition Internal Combustion Engines; and Subpart KKKK: Stationary Combustion Turbines. U.S. EPA also establishes standards that are specifically designed to reduce the potency, persistence, or potential for bioaccumulation of toxic air pollutant under CAA Section 112, National Emission Standards for Hazardous Air Pollutants (NESHAP). NESHAP relating to oil and natural gas operations include: Subpart V (40 CFR 61): Equipment Leaks and Fugitive Emissions; Subpart H (40 CFR 63): Hazardous Organic Pollutant Equipment Leaks; Subpart HH: Oil and Natural Gas Production; Subpart HHH: Natural Gas Transmission and Storage; Subpart YYYY: Stationary Combustion Turbines; and Subpart ZZZZ: Reciprocating Internal Combustion Engines.
SmartWay	SmartWay is an EPA program that reduces transportation-related emissions by creating incentives to improve supply chain fuel efficiency. It aims to increase the availability and market penetration of fuel efficient technologies and strategies that help freight companies save money while also reducing adverse environmental impacts.
Other Applicable Federal-Level Regulations	This includes all other applicable regulations at the federal level for portions of the project area that are outside of the U.S. (e.g., Canada).
State	
California Clean Air Act (CCAA) CCR (Titles 13 and 17)	ARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the CCAA. The CCAA, which was adopted in 1988, required the ARB to establish California ambient air quality standards (CAAQS). Under this authority, ARB has adopted regulations to reduce emissions from off-road mobile equipment.
Air Toxics “Hot Spots” Information and Assessment Act (AB 2588, Connelly 1987)	The AB 2588 air toxics “Hot Spots” program requires facilities to report their air toxics emissions, ascertain health risks, and to notify nearby residents of significant risks. In September 1992, the “Hot Spots” Act was amended by Senate Bill 1731 which required facilities that pose a significant health risk to the community to reduce their risk through

Table 4: Applicable Laws and Regulations for Air Quality	
Regulation	**Description**
	a risk management plan.
Toxic Air Contaminant Identification and Control Act (AB 1807, Tanner 1983)	The Toxic Air Contaminant Identification and Control Act (AB 1807, Tanner 1983) created California's program to reduce exposure to air toxics. AB 1807 established a two-step process of risk identification and risk management to address the potential health effects from air toxic substances and protect the public health of Californians. During the first step (identification), ARB and the Office of Environmental Health Hazard Assessment (OEHHA) determine if a substance should be formally identified as a toxic air contaminant (TAC) in California. During the second step (risk management), ARB reviews the emission sources of an identified TAC to determine if any regulatory action is necessary to reduce the risk. AB 1807 was amended in 1993 by AB 2728 which required the ARB to identify the 189 federal hazardous air pollutants as TACs. To reduce exposure to air toxics, ARB has adopted several Airborne Toxic Control Measures (ATCMs) that may impact oil and natural gas operations including vehicle idling limits and emissions limits on portable and stationary diesel engines.
Oil and Gas: Well Stimulation (SB 4, Pavley 2013)	SB 4 added Article 3 to, Division 3, Chapter 1 of the Public Resources Code, including the following provisions: • Section 3160 (a)(4): requires the Natural Resources Agency to complete an independent scientific study to "…evaluate the hazards and risks and potential hazards and risks that well stimulation treatments pose to natural resources and public, occupational, and environmental health and safety…" with consideration of air emissions, including GHG, and the potential degradation of air quality, along with other potential environmental impacts of well stimulation treatments. • Section 3160 (b)(1)(A): requires consultation between the Division of Oil, Gas and Geothermal Resources (DOGGR) and affected agencies, including ARB and local air districts during the process of adopting rules and regulations for well stimulation treatments. • Section 3160 (c)(2): requires DOGGR to enter into formal agreements with agencies including the ARB and local air districts where well stimulation treatments may occur to establish responsibilities for air quality monitoring related to well stimulation treatments and related activities.
Waste Heat and Carbon Emissions Reduction Act	This Act is designed to encourage the development of new combined heat and power (CHP) systems in California with a generating capacity of not more than 20 megawatts. Section 2843 of the Act provides that

Table 4: Applicable Laws and Regulations for Air Quality	
Regulation	**Description**
	the Energy Commission's guidelines require that CHP systems: be designed to reduce waste energy; have a minimum efficiency of 60 percent; have NO_X emissions of no more than 0.07 pounds per megawatt-hour; be sized to meet the eligible customer generation thermal load; operate continuously in a manner that meets the expected thermal load and optimizes the efficient use of waste heat; be cost effective, technologically feasible, and environmentally beneficial.
Other Applicable State-Level Regulations	This includes all other applicable regulations at the State level for portions of the project area that are outside of California (e.g., AB 1807 and AB 2588).
Local	
Air District Permits and Clean Air Plans	The 35 local air districts in California have primary responsibility for controlling air pollution from stationary sources. Stationary sources of air pollution must obtain permits from one of the air districts throughout California. For areas that do not attain the NAAQS or CAAQS, the local air district develops clean air strategies and air quality plans for the attainment of ambient air quality standards. Local air districts also adopt and enforce of rules and regulations concerning sources of air pollution.

Table 5 describes the CEQA thresholds of significance by air basin and air districts with potential air quality impacts identified in Chapter 4.

Table 5: Applicable Laws and Regulations for Air Quality								
Air Basin	**Air District**	**NOx**	**VOC or ROC or ROG**	**PM10**	**PM2.5**	**TAC**	**CO**	**SOx**
North Coast	North Coast[22]	No adopted mass-based significance thresholds						
North Central Coast	Monterey Bay[23]	137 lbs/day	137 lbs/day	82 lbs/day	No adopted mass-based threshold	must comply with Rule 1000	550 lbs/day	150 lbs/day
San Francisco Bay Area	Bay Area[24]	BAAQMD thresholds must be determined by lead agencies						

[22] North Coast Unified Air Quality Management District (NCUAQMD) utilizes the Best Available Control Technology (BACT) emission rates for stationary sources. NOx- 50 lbs/day, 40 tons/year; PM10- 80 lbs/day, 15 tons/year; PM2.5- 50 lbs/year, 10 tons/year; ROC- 50 lbs/year, 40 tons/year; SOx- 80 lbs/day, 40 tons/year; CO- 500 lbs/day; 100 tons/year. NCUAQMD Rule and Regulations, Rule 110 - New Source Review (NSR) And Prevention of Significant Deterioration (PSD), (NCUAQMD; NCUAQMD 2015). NCUAPCD has no current thresholds for toxics, but recommends the use of the latest version of California Air Pollution Control Officer's Association's (CAPCOA) "Health Risk Assessments for Proposed Land Use Project". (CAPCOA 2009)

[23] (MBUAPCD 2008)

[24] The Bay Area Air Quality Management District's June 2010 adopted thresholds of significance were challenged in a lawsuit. On March 5, 2012 the Alameda County Superior Court issued a judgment finding that the Air District had failed to comply with CEQA when it adopted the thresholds. The court found that the adoption of the thresholds was a project under CEQA and ordered the Air District to examine whether the thresholds would have a significant impact on the environment under CEQA before recommending their use. The court did not determine whether the thresholds are or are not based on substantial evidence and thus valid on the merits. The court issued a writ of mandate ordering the District to set aside the thresholds and cease dissemination of them until the Air District had complied with CEQA. (BAAQMD 2012) As of this time, the Air District has not adopted new thresholds of significance. (BAAQMD 2014)
Lead agencies may still rely on the Air District's CEQA Guidelines for assistance in calculating air pollution emissions, obtaining information regarding the health impacts of air pollutants, and identifying potential mitigation measures. From the May 2011 CEQA Guidelines: NOx- 54 lbs/day and 10 tpy; ROG- 54 lbs/day and 10 tpy; PM10- 82 lbs/day and 15 tpy; PM2.5- 54 lbs/day and 10 tpy; TAC- > 10 in a million (carcinogen)

Table 5: Applicable Laws and Regulations for Air Quality								
Air Basin	**Air District**	**NOx**	**VOC or ROC or ROG**	**PM10**	**PM2.5**	**TAC**	**CO**	**SOx**
South Central Coast	Santa Barbara County[25]	55 lbs/day	55 lbs/day	80 lbs/day	No adopted mass-based threshold	≥10 in a million (carcinogen)	No adopted mass-based threshold	No adopted mass-based threshold
	Ventura County[26]	25 lbs/day; 5 lbs/day in the Ojai Planning Area	25 lbs/day; 5 lbs/day in the Ojai Planning Area	Based on modeling	No mass-based threshold adopted	>10 in a million (carcinogen)	No adopted mass-based threshold	No adopted mass-based threshold
South Coast	South Coast[27]	55 lbs/day	55 lbs/day	150 lbs/day	55 lbs/day	≥10 in a million	550 lbs/day	150 lbs/day
Sacramento Valley	Butte[28]	25 lbs/day	25 lbs/day	80 lbs/day	No adopted mass-based threshold	No adopted mass-based threshold	No adopted mass-based threshold	No adopted mass-based threshold
	Colusa[29]	No adopted mass-based significance thresholds						

[25] (SB County 2008)
[26] VCAPCD 2003)
[27] (SCAQMD 2015)
[28] (BCAQMD 2014)
[29] The Colusa County APCD uses the same thresholds of significance for air quality impacts as other air quality districts in the Northern Sacramento Valley Air Basin (NSVAB). These thresholds of significance are contained in the Indirect Source Review Guidelines, prepared by the Butte County Air Quality Management District in conjunction with the NSVAB.

Table 5: Applicable Laws and Regulations for Air Quality								
Air Basin	**Air District**	**NOx**	**VOC or ROC or ROG**	**PM10**	**PM2.5**	**TAC**	**CO**	**SOx**
	Feather River[30]	25 lbs/day	25 lbs/day	80 lbs/day	No adopted mass-based threshold	No adopted mass-based threshold	No adopted mass-based threshold	No adopted mass-based threshold
	Glenn[31]	No adopted mass-based significance thresholds						
	Sacramento[32]	65 lbs/day	65 lbs/day	zero, if BACT/BMPs applied then 80 lbs/day and 14.6 tpy	zero, if BACT/BMPs applied then 82 lbs/day and 15 tpy	≥10 in a million (carcinogen)	No adopted mass-based threshold	No adopted mass-based threshold
	Tehama[33]	>25 lbs/day w/ feasible mitigation; >137 lbs/day EIR w/ offsite mitigation	>25 lbs/day w/ feasible mitigation; >137 lbs/day EIR w/ offsite mitigation	>80 lbs/day w/ feasible mitigation; >137 lbs/day EIR w/ offsite mitigation	No adopted mass-based threshold	No adopted mass-based threshold	No adopted mass-based threshold	No adopted mass-based threshold

[30] (FRAQMD 2010)
[31] Glenn County APCD uses the Shasta County thresholds of significance from the *Shasta County General Plan*; (Shasta County 2004)
[32] (SMAQMD 2015; SMAQMD 2016)
[33] (TCAPCD 2015)

Table 5: Applicable Laws and Regulations for Air Quality								
Air Basin	**Air District**	**NOx**	**VOC or ROC or ROG**	**PM10**	**PM2.5**	**TAC**	**CO**	**SOx**
	Yolo-Solano[34]	10 tpy	10 tpy	80 lbs/day	No adopted mass-based threshold	≥10 in a million (carcinogen)	No adopted mass-based threshold	No adopted mass-based threshold
San Joaquin Valley	San Joaquin[35] Valley	10 tpy	10 tpy	5 tpy	15 tpy	TAC- ≥20 in a million (carcinogens)	100 tpy	27 tpy

[34] (YSAQMD 2007)
[35] (SJVAPCD 2016)

Table 6 describes the ambient air quality attainment status for oil and gas producing air basins (ARB 2013b; USEPA 2016).

Table 6: Ambient Air Quality Attainment Status for Oil and Gas Producing Air Basin								
Air Basin	**Air District(s)**		**Ozone[1]**	**PM10**	**PM2.5[2]**	**CO**	**NO_2**	**SO_2**
North Coast	North Coast	California Designation	Attainment	Nonattainment[3]	Attainment	Attainment/ Unclassified	Attainment	Attainment
		Federal Designation	Attainment/ Unclassified	Unclassified	Attainment/ Unclassified	Attainment/ Unclassified	Attainment/ Unclassified	Unclassified
North Central Coast	Monterey Bay	California Designation	Nonattainment	Nonattainment	Attainment	Attainment/ Unclassified	Attainment	Attainment
		Federal Designation	Attainment/ Unclassified	Unclassified	Attainment/ Unclassified	Attainment/ Unclassified	Attainment/ Unclassified	Unclassified
San Francisco Bay Area	Bay Area	California Designation	Nonattainment	Nonattainment	Nonattainment	Attainment	Attainment	Attainment
		Federal Designation	Nonattainment (marginal)	Unclassified	Nonattainment (moderate)	Attainment/ Unclassified	Attainment/ Unclassified	Attainment
South Central Coast	Santa Barbara Ventura	California Designation	Nonattainment	Nonattainment	Attainment/ Unclassified	Attainment	Attainment	Attainment
		Federal Designation	Nonattainment (Serious)[4]; Attainment/ Unclassified	Unclassified	Attainment/ Unclassified	Attainment/ Unclassified	Attainment/ Unclassified	Attainment/ Unclassified
South Coast	South Coast	California Designation	Nonattainment	Nonattainment	Nonattainment	Attainment	Attainment	Attainment
		Federal Designation	Nonattainment (extreme)	Attainment	Nonattainment (serious)	Attainment/ Unclassified	Attainment/ Unclassified	Attainment
Sacramento Valley	Butte Colusa	California Designation	Attainment[5]; Nonattainment	Nonattainment	Nonattainment[6]	Attainment/ Unclassified	Attainment	Attainment

Table 6: Ambient Air Quality Attainment Status for Oil and Gas Producing Air Basin								
Air Basin	**Air District(s)**		**Ozone[1]**	**PM10**	**PM2.5[2]**	**CO**	**NO_2**	**SO_2**
	Feather River Glenn Sacramento Tehama Yolo-Solano	Federal Designation	Nonattainment (marginal); Nonattainment (Severe)[7]; Attainment/ Unclassified	Attainment/ Unclassified	Attainment/ Unclassified; Nonattainment (moderate)	Attainment/ Unclassified	Attainment/ Unclassified	Unclassified
San Joaquin Valley	San Joaquin Valley	California Designation	Nonattainment	Nonattainment	Nonattainment	Attainment/ Unclassified	Attainment	Attainment
		Federal Designation	Nonattainment (extreme)	Attainment	Nonattainment (serious)	Attainment/ Unclassified	Attainment/ Unclassified	Attainment/ Unclassified

1- Federal 2008 8-hour standard
2- Federal 2006 24-hour standard
3- Humboldt County only nonattainment area, remainder attainment
4- Serious nonattainment for Ventura County
5- Attainment only for Colusa and Glenn County
6- Butte County only nonattainment area, remainder attainment or unclassified
7- Marginal nonattainment Butte County only; severe nonattainment Yolo-Solano, Feather River (partial), and Sacramento Metropolitan areas
8- Moderate nonattainment for Butte County (partial) and Sacramento nonattainment area (consisting of partial areas of El Dorado, Placer, Yolo-Solano) and Sacramento

Where any part of the air district(s) are designated as “unclassified” for a given pollutant, the designation “Unclassified” is added to each cell

4.0 BIOLOGICAL RESOURCES

Existing Conditions

The state's geography and topography have created distinct local climates ranging from high rainfall in northwestern mountains to the driest place in North America, Death Valley. North to south, the state extends for almost 800 miles, bridging the temperate rainforests in the Pacific Northwest and the subtropical arid deserts of Mexico. Many parts of the state experience Mediterranean weather patterns, with cool, wet winters and hot, dry summers. Summer rain is indicative of the eastern mountains and deserts, driven by the western margin of the North American monsoon. Along the northern coast abundant precipitation and ocean air produces foggy, moist conditions. High mountains have cooler conditions, with a deep winter snow pack in normal climate years. Desert conditions exist in the rain shadow of the mountain ranges (CDFW 2015).

While the state is largely considered to have a Mediterranean climate, it can be further subdivided into six major climate types: Desert, Marine, Cool Interior, Highland, Steppe, and Mediterranean. California deserts, such as the Mojave, are typified by a wide range of elevation with more rain and snow in the high ranges, and hot, dry conditions in valleys. Cool Interior and Highland climates can be found on the Modoc Plateau, Klamath, Cascade, and Sierra ranges. Variations in slope, elevation, and aspect of valleys and mountains result in a range of microclimates for habitats and wildlife. For example, the San Joaquin Valley, exhibiting a Mediterranean climate, receives sufficient springtime rain to support grassland habitats, while still remaining hot and relatively dry in summer. Steppe climates include arid, shrub-dominated habitats that can be found in the Owens Valley, east of the Sierra Nevada, and San Diego, located in coastal southern California (CDFW 2015).

The marine climate has profound influence over terrestrial climates, particularly near the coast. Additionally, the state is known for variability in precipitation because of the El Niño-Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO). Oscillations are the cyclical shifting of high and low pressure systems, as evidenced by the wave pattern of the jet stream in the northern hemisphere. The ENSO is the cycle of air pressure systems influenced by the location of warm and cold sea temperatures. El Niño events occur when waters are warmer in the eastern Pacific Ocean, typically resulting in greater precipitation in southern California and less precipitation in northern California, and La Niña events occur when waters are colder in the eastern Pacific resulting in drier than normal conditions in southern California and wetter conditions in northern California during late summer and winter. The warmer ocean temperatures associated with El Niño conditions also result in decreased upwelling in the Pacific Ocean (CDFW 2015).

a) Plant Diversity

California has the highest numbers of native and endemic plant species of any state, with approximately 6,500 species, subspecies, and varieties of plants, representing 32 percent of all vascular plants in the United States. Nearly one-third of the state's plant species are endemic, and California has been recognized as one of 34 global hotspots for plant diversity. Within the California Floristic Province, which encompasses the Mediterranean area of Oregon, California, and northwestern Baja, 2,124 of the 3,488 species are endemic, representing a 61 percent rate of endemism. Over 200 species, subspecies, and varieties of native plants are designated as rare, threatened, or endangered by state law, and over 2,000 more plant taxa are considered to be of conservation concern (CDFW 2015).

b) Wildlife Diversity

California has a large number of animal species, representing a substantial proportion of the wildlife species nationwide. The state's diverse natural communities provide a wide variety of habitat conditions for wildlife. The state's wildlife species include approximately 100 reptile species, 75 amphibian species, 650 bird species, and 220 mammal species. Additionally, 48 mammals, 64 birds, 72 amphibians and reptiles, and 20 freshwater fish live in California and nowhere else (CDFW 2015).

California exhibits a wide range of aquatic habitats from the Pacific Ocean to isolated hillside seeps, to desert oases that support both water-dependent species and provide essential seasonal habitat for terrestrial species. Perennial and ephemeral rivers and streams, riparian areas, vernal pools, and coastal wetlands support a diverse array of flora and fauna, including 150 animal and 52 plant species that are designated special status species. The California Natural Diversity Database identifies 123 different aquatic habitat-types in California, based on fauna. Of these, 78 are stream habitat-types located in seven major drainage systems: Klamath, Sacramento-San Joaquin, North/Central Coast, Lahontan, Death Valley, South Coast, and Colorado River systems. These drainage systems are geologically separated and contain distinctive fishes and invertebrates. California has approximately 70 native resident and anadromous fish species, and 72 percent of the native freshwater fishes in California are either listed, or possible candidates for listing as threatened or endangered, or are extinct (CDFW 2015).

Regulatory Setting

Table 7 describes the applicable laws and regulations for biological resources associated with the Proposed Regulation.

Table 7: Applicable Laws and Regulations for Biological Resources

Applicable Law	Description
Federal	
Federal Endangered	Designates and provides for protection of threatened and

Table 7: Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
Species Act	endangered plant and animal species, and their critical habitat.
Migratory Bird Treaty Act	Makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated in the Migratory Bird Treaty Act.
Clean Water Act (CWA)	Requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge from dredged or fill materials into Waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants. By federal law, every applicant for a federal permit or license for an activity that may result in a discharge into a California water body, including wetlands, must request State certification that the proposed activity would not violate State and federal water quality standards.
Rivers and Harbors Act of 1899	Requires permit or letter of permission from USACE prior to any work being completed within navigable waters.
Coastal Zone Management Act (CZMA) of 1972	The CZMA assists states in the development and implementation of management programs for coastal zone land and water resources, giving full consideration to ecological, cultural, historic, and aesthetic values as well as to the needs of economic development.
U.S. EPA Section 404 (b)(1) Guidelines	Requires the USACE to analyze alternatives in a sequential approach such that the USACE must first consider avoidance and minimization of impacts to the extent practicable to determine whether a proposed discharge can be authorized.
California Desert Conservation Area Plan (CDCA)	Comprises one of two national conservation areas established by Congress at the time of the passage of the. FLPMA outlines how BLM would manage public lands. Congress specifically provided guidance for the management of the CDCA and directed the development of the 1980 CDCA Plan.
Federal Noxious Weed Act of 1974 (P.L. 93-629) (7 U.S.C. 2801 et seq.; 88 Stat. 2148)	Establishes a federal program to control the spread of noxious weeds. Authority is given to the Secretary of Agriculture to designate plants as noxious weeds by regulation, and the movement of all such weeds in interstate or foreign commerce was prohibited except under permit.
Executive Order 13112, “Invasive Species,” February 3, 1999	Federal agencies are mandated to take actions to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause.
Executive Order 11988, “Floodplain Management,” May 24, 1977	Requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable

Table 7: Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
	alternative.
Executive Order 11990, "Protection of Wetlands," May 24, 1977	Requires all federal agencies to consider wetland protection as an important part of their policies and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds," January 10, 2001	Requires that each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations develop and implement a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service (USFWS) that shall promote the conservation of migratory bird populations.
Wild Free-Roaming Horses and Burros Act	Provides for the protection of wild free-roaming horses and burros. Directs BLM and the U.S. Forest Service (USFS) to manage wild horses and burros on lands under their jurisdiction.
Bald and Golden Eagle Protection Act	Declares it is illegal to take, possess, sell, purchase, barter, offer to sell or purchase or barter, transport, export or import a bald or golden eagle, alive or dead, or any part, nest or egg of these eagles unless authorized. Active nest sites are also protected from disturbance during the breeding season.
BLM Manual 6840 — Special Status Species Management (BLM 2001),	Establishes special status species policy on BLM land for plant and animal species and the habitats on which they depend. The policy refers species designated by the BLM State Director as sensitive.
Listed Species Recovery Plans and Ecosystem Management Strategies	Provides guidance for the conservation and management of sufficient habitat to maintain viable populations of listed species and ecosystems. Relevant examples include, but are not limited to, the Desert Tortoise Recovery Plan, Flat-tailed Horned Lizard Rangewide Management Strategy; Amargosa Vole Recovery Plan, Recovery Plan for Upland Species of the San Joaquin
State	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species.
Natural Community Conservation Planning (NCCP) Act 1991	The primary objective of the NCCP program is to conserve natural communities at the ecosystem level while accommodating compatible land use. An NCCP identifies and provides for the regional or area-wide protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. There are currently 23 NCCPs that have been adopted or are in progress in California (CDFW 2014).

Table 7: Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
Porter-Cologne Water Quality Control Act	Requires that each of the nine RWQCBs prepare and periodically update basin plans for water quality control. Each basin plan sets forth water quality standards for surface water and groundwater and actions to control nonpoint and point sources of pollution to achieve and maintain these standards.
Lempert-Keene-Seastrand Oil Spill Prevention and Response Act	The Oil Spill Prevention and Response Act requires that persons causing a spill begin immediate cleanup, follow approved contingency plans, and that they fully mitigate impacts to wildlife.
Z'berg-Nejedly Forest Practice Act	Ensures that logging on timberland is performed in a manner that will preserve and protect fish, wildlife, forests and streams, enforced by the California Department for Forestry and Fire Protection (CAL FIRE).
California Coastal Act (PRC, Section 30000 et seq.)	The California Coastal Act requires minimizing adverse impacts to biological productivity of coastal waters and protection of environmentally sensitive habitats.
California Forest Practice Rules 2010	State Board of Forestry and Fire Protection has authority delegated by legislature to adopt forest practice and fire protection regulations on nonfederal lands. These regulations carry out California legislature's mandates to protect and enhance the State's unique forest and wildland resources.
Wetlands Preservation (Keene-Nejedly California Wetlands Preservation Act) (PRC, Section 5810 et seq.)	California has established a successful program of regional, cooperative efforts to protect, acquire, restore, preserve, and manage wetlands. These programs include, but are not limited to, the Central Valley Habitat Joint Venture, the San Francisco Bay Joint Venture, the Southern California Wetlands Recovery Project, and the Inter-Mountain West Joint Venture.
California Wilderness Preservation System (PRC, Section 5093.30 et seq.)	Establishes a California wilderness preservation system that consists of State-owned areas to be administered for the use and enjoyment of the people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, provide for the protection of such areas, preserve their wilderness character, and provide for the gathering and dissemination of information regarding their use and enjoyment as wilderness.
Significant Natural Areas (Fish and Game Code section 1930 et seq.)	Designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitat.
Protection of Birds and Nests (Fish and Game Code section 3503 and 3503.5)	Protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Raptors (e.g., hawks and owls) are specifically protected.
Migratory Birds (Fish and Game Code section 3513)	Protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame

Table 7: Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
	birds.
Fur-bearing Mammals (Fish and Game Code sections 4000 and 4002)	Lists fur-bearing mammals which require a permit for take.
Fully Protected Species (Fish and Game Code Sections 3511,4700, 5050, and 5515)	Identifies several amphibian, reptile, fish, bird and mammal species which are Fully Protected. The California Department of Fish and Wildlife (CDFW) cannot issue a take permit), except for take related to scientific research.
California Environmental Quality Act (CEQA Guidelines, CCR, Title 14, Section 15380)	CEQA defines rare species more broadly than the definitions for species listed under the State and federal Endangered Species Acts. Under section 15830, species not protected through State or federal listing but nonetheless demonstrable as “endangered” or “rare” under CEQA should also receive consideration in environmental analyses. Included in this category are many plants considered rare by the California Native Plant Society (CNPS) and some animals on the CDFW’s Special Animals List.
Oak Woodlands (California PRC Section 21083.4)	Requires counties to determine if a project within their jurisdiction may result in conversion of oak woodlands that would have a significant adverse effect on the environment. If the lead agency determines that a project would result in a significant adverse effect on oak woodlands, mitigation measures to reduce the significant adverse effect of converting oak woodlands to other land uses are required.
Lake and Streambed Alteration Agreement (Fish and Game Code sections 1600 et seq.)	Regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California designated by CDFW in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process.
California Desert Native Plants Act of 1981 (Food and Agricultural Code section 80001 et seq. and California Fish and Game Code sections 1925-1926)	Protects non-listed California desert native plants from unlawful harvesting on both public and private lands in Imperial, Inyo, Kern, Los Angeles, Mono, Riverside, San Bernardino, and San Diego counties. Unless issued a valid permit, wood receipt, tag, and seal by the commissioner or sheriff, harvesting, transporting, selling, or possessing specific desert plants is prohibited.
Food and Agriculture Code, Section 403	The California Department of Food and Agriculture is designated to prevent the introduction and spread of injurious insect or animal pests, plant diseases, and noxious weeds.
Noxious Weeds (Title 3, California Code of Regulations, Section 4500)	List of plant species that are considered noxious weeds.
Local	

Table 7: Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
Regional Habitat Conservation Plans (HCP) and Natural Communities Conservation Plan (NCCP)	HCPs and NCCPs establish a coordinated process for permitting and mitigating the incidental take of endangered species and conserving natural resources. Approved HCPs and NCCPs potentially relevant to proposed Advanced Clean Cars (ACC) Program include, but are not limited to, the Western Riverside County HCP; Lower Colorado River Multi-Species Conservation Plan; Coachella Valley Multi-Species HCP; Orange County Central/Coastal NCCP/HCP; Kern Water Bank HCP; Southeastern Lincoln County, Nevada HCP; and the Mojave and Colorado Desert regions and Solano Multispecies Habitat Conservation Plan.
Various City and County General Plans	General plans typically designate areas for land usages, guiding where new growth and development should occur while providing a plan for the comprehensive and long-range management, preservation, and conservation of and natural resources and open-space lands.
Various Local Ordinances	Local ordinances provide regulations for proposed projects for activities such as grading plans, erosion control, tree removal, protection of sensitive biological resources and open space.

5.0 CULTURAL RESOURCES

Existing Conditions

Archaeological resources include both prehistoric and historic remains of human activity. Built environment resources include an array of historic buildings, structures, and objects serving as a physical connection to California's past. Traditional or ethnographic cultural resources include Native American sacred sites (traditional cultural properties), traditional cultural places, and traditional resources of any ethnic community that are important for maintaining the cultural traditions of any group.

"Historical resources" is a term with defined statutory meaning and includes any prehistoric or historic archaeological site, district, built environment resource, or traditional cultural resource recognized as historically or culturally significant (California PRC Section 21084.1; 14 California Code of Regulations [CCR] Section 15064.5(a)).

Paleontological resources include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains that are more than 5,000 years old and occur mainly in Pleistocene or older sedimentary rock units.

Cultural Resource Setting

Prehistoric Overview

California was occupied by different prehistoric cultures dating to at least 12,000 to 13,000 years ago. Evidence for the presence of humans during the Paleoindian Period prior to about 8,000 years ago is relatively sparse and scattered throughout the State; most surface finds of fluted Clovis or Folsom projectile points or archaeological sites left by these highly mobile hunter-gatherers are associated with Pleistocene lakeshores, the Channel Islands, or the central and southern California coast (Rondeau et al. 2007). Archaeological evidence from two of the Northern Channel Islands located off the coast from Santa Barbara indicates the islands were colonized by Paleoindian peoples at least 12,000 years ago, likely via seaworthy boats (Erlandson et al. 2007). By 10,000 years ago, inhabitants of this coastal area were using fishhooks, weaving cordage and basketry, hunting marine mammals and sea birds, and producing ornamental shell beads for exchange with people living in the interior of the State (Erlandson et al. 2007). This is the best record of early maritime activity in the Americas, and combined with the fluted points, indicates California was colonized by both land and sea during the Paleoindian period (Jones and Klar 2007b).

With climate changes between 10,000 and 7,000 years ago at the end of the Pleistocene and into the early Holocene, Lower Archaic peoples adjusted to the drying of pluvial lakes, rise in sea level, and substantial alterations in vegetation communities. Approximately 6,000 years ago, vegetation communities similar to those of the present were established in the majority of the State, while the changes in sea level also affected the availability of estuarine resources (Jones and Klar 2007b). The archaeological record indicates subsistence patterns during the Lower Archaic and subsequent Middle Archaic Period shifted to an increased emphasis on plant resources, as evidenced by an abundance of milling implements in archaeological sites dating between 8,000 and 3,000 years ago.

Approximately 3,000 years ago, during the Upper Archaic and Late Prehistoric Periods, the complexity of the prehistoric archaeological record reflects increases in specialized adaptations to locally available resources such as acorns and salmon, in permanently occupied settlements, and in the expansion of regional populations and trade networks (Moratto 1984; Jones and Klar 2007a). During the Upper Archaic, marine shell beads and obsidian continue to be the hallmark of long-distance trade and exchange networks developed during the preceding period (Hughes and Milliken 2007). Large shell midden/mounds at coastal and inland sites in central and southern California, for example, attest to the regular reuse of these locales over hundreds of years or more from the Upper Archaic into the Late Prehistoric period. In the San Francisco Bay region alone, over 500 shell mounds were documented in the early 1900s (Moratto 1984).

Changes in the technology used to pursue and process resources are some of the hallmarks of the Late Prehistoric period. These include an increase in the prevalence of mortars and pestles, a diversification in types of watercraft and fishhooks, and the

earliest record for the bow and arrow in the State that occurs in both the Mojave Desert and northeast California nearly 2,000 years ago (Jones and Klar 2007b). The period also witnessed the beginning of ceramic manufacture in the southeast desert region, southwest Great Basin, and parts of the Central Valley.

During the Late Prehistoric period, the development of social stratification and craft specialization accompanied the increase in sedentism, as indicated by the variety of artifacts, including bone tools, coiled and twined basketry, obsidian tools, marine shell beads, personal ornaments, pipes, and rattles, by the use of clamshell disk beads and strings of dentalium shell as a form of currency, and by variation in burial types and associated grave goods (Moratto 1984; Jones and Klar 2007a). Pictographs, painted designs that are likely less than 1,000 years old, and other non-portable rock art created during this period likely had a religious or ceremonial function (Gilreath 2007). Osteological evidence points to intergroup conflict and warfare in some regions during this period (Jones and Klar 2007b), and there also appears to have been a decline or disruption in the long-distance trade of obsidian and shell beads approximately 1,200 years ago in parts of the State (Hughes and Milliken 2007).

Ethnographic Overview

At the time of European contact, California was the home of approximately 310,000 indigenous peoples with a complex of cultures distinguished by linguistic affiliation and territorial boundaries (Kroeber 1925, Cook 1978, Heizer 1978, Ortiz 1983, d'Azevedo 1986). At least 70 distinct native Californian cultural groups, with even more subgroups, inhabited the vast lands within the State. The groups and subgroups spoke between 74 and 90 languages, plus a large number of dialects (Shipley 1978, University of California at Berkeley 2009-2010).

In general, these mainly sedentary, complex hunter-gatherer groups of indigenous Californians shared similar subsistence practices (hunting, fishing, and collecting plant foods), settlement patterns, technology, material culture, social organization, and religious beliefs (Kroeber 1925, Heizer 1978, Ortiz 1983, d'Azevedo 1986). Permanent villages were situated along the coast, interior waterways, and near lakes and wetlands. Population density among these groups varied, depending mainly on availability and dependability of local resources, with the highest density of people in the northwest coast and Santa Barbara Channel areas and the least in the State's desert region (Cook 1976). Networks of foot trails were used to connect groups to hunting or plant gathering areas, rock quarries, springs or other water sources, villages, ceremonial places, or distant trade networks (Heizer 1978).

The social organization of California's native peoples varied throughout the State, with villages or political units generally organized under a headman who was also the head of a lineage or extended family or achieved the position through wealth (Bean 1978). For some groups, the headman also functioned as the religious ceremonial leader. Influenced by their Northwest Coast neighbors, the differential wealth and power of individuals was the basis of social stratification and prestige between elites and

commoners for the Chilula, Hupa, Karok, Tolowa, Wiyot, and Yurok in the northwest corner of the State. Socially complex groups were also located along the southern California coast where differential wealth resulted in hierarchical classes and hereditary village chiefs among the Chumash, Gabrielino, Juaneño, and Luiseño (Bean and Smith 1978, Arnold and Graesch 2004).

At the time of Spanish contact, religious practices among native Californian groups varied, but ethnographers have recognized several major religious systems (Bean and Vane 1978: pp. 662-669). Many of the groups in the north-central part of the State practiced the *Kuksu* cult, primarily a ceremonial and dance organization, with a powerful shaman as the leader. Log drums, flutes, rattles, and whistles accompanied the elaborate ceremonial dances. The World Renewal cult in the northwestern corner of the State extended as far north as Alaska, entailed a variety of annual rites to prevent natural disasters, maintain natural resources and individual health, and were funded by the wealthy class. The *Toloache* cult was widespread in central and southern California and involved the use of narcotic plant (commonly known as datura or jimsonweed) materials to facilitate the acquisition of power. On the southern coast among Takic-speaking groups, the basis of Gabrielino, Juaneño, and Luiseño religious life was the *Chinigchinich* cult, which appeared to have developed from the *Toloache* cult. *Chinigchinich*, the last of a series of heroic mythological figures, gave instruction on laws and institutions, taught people how to dance, and later withdrew into heaven where he rewarded the faithful and punished those who disobeyed his laws. The *Chinigchinich* religion seems to have been relatively new when the Spanish arrived, and could have been influenced by Christianity.

Trade and exchange networks were a significant part of the economy and social organization among California's Native American groups (Heizer 1978). Obsidian, steatite, beads, acorns, baskets, animal skins, and dried fish were among the variety of traded commodities. Inland groups supplied obsidian from sources along the Sierra Nevada Mountains, in Napa Valley, and in the northeast corner of the State. Coastal groups supplied marine shell beads, ornaments, and marine mammal skins. In addition to trading specific items, clamshell disk beads made from two clam species available on the Pacific coast were widely used as a form of currency (Kroeber 1922). In northwestern California, groups used strings of dentalium shell as currency.

The effect of Spanish settlement and missionization in California marks the beginning of a devastating disruption of native culture and life ways, with forced population movements, loss of land and territory (including traditional hunting and gathering locales), enslavement, and decline in population numbers from disease, malnutrition, starvation, and violence during the historic period (Castillo 1978). In the 1830s, foreign disease epidemics swept through the densely populated Central Valley, adjacent foothills, and North Coast Ranges decimating indigenous population numbers (Cook 1978). By 1850, with their lands, resources and way of life being overrun by the steady influx of non-native people during the Gold Rush, California's native population was reduced to about 100,000; by 1900, there were only 20,000 or less than seven percent

of the pre-contact number. Existing reservations were created in California by the federal government beginning in 1858 but encompass only a fraction of native lands.

In 2004, the Native American population in California was estimated at over 383,000 (OPR 2005). Although acknowledged as non-federally recognized California Native American tribes on the contact list maintained by the Native American Heritage Commission (NAHC), many groups continue to await federal tribal status recognition. As of 2005, there were 109 federally recognized tribes within the state, along with dozens of non-federally recognized tribes. Members of these tribes have specific cultural beliefs and traditions with unique connections to areas of California that are their ancestral homelands.

Historic Overview

Post-contact history for the State is generally divided into the Spanish period (1769–1822), Mexican period (1822–1848), and American period (1848–present). The establishment of Fort Ross by Alaska-based Russian traders also influenced post-contact history for a short period (1809–1841) in the region north of San Francisco Bay. Although there were brief visits along the Pacific coast by European explorers (Spanish, Russian, and British) between 1529 and 1769 of the territory claimed by Spain, the expeditions did not journey inland.

Spanish Period (1769–1822)

Spain's colonization of California began in 1769 with the overland expeditions from San Diego to San Francisco Bay by Lt. Colonel Gaspar de Portolá, and the establishment of a mission and settlement at San Diego. Between 1769 and 1823, the Spanish and the Franciscan Order established a series of 21 missions paralleling the coast along El Camino Real between San Diego and Sonoma (Rolle 1969). Between 1769 and 1782, Spain built four presidios (San Diego, Monterey, San Francisco, and Santa Barbara) to protect the missions, and by 1871 had established two additional pueblos at Los Angeles and San José.

Under Spanish law, large tracts of land, including cattle ranches and farms, fell under the jurisdiction of the missions. Native Americans were removed from their traditional lands, converted to Christianity, concentrated at the missions, and used as labor on the mission farms and ranches (Castillo 1978). Since the mission friars had civil as well as religious authority over their converts, they held title to lands in trust for indigenous groups. The lands were to be repatriated once the native peoples learned Spanish laws and culture.

Russian Period (1809–1841)

In 1809, Alaska-based Russians started exploring the northern California coast with the goal of hunting otter and seal and feeding their Alaskan colonies. The first Russian settlement, was established in 1811–1812 by the Russian–American Fur Company to protect the lucrative marine fur trade and to grow produce for their Alaskan colonies. In 1841, as a result of the decline in local sea otter population and the failure of their

agricultural colony, combined with a change in international politics, the Russians withdrew from California (Schuyler 1978).

Mexican Period (1822–1848)

Following independence from Spain in 1822, the economy during the Mexican period depended on the extensive rancho system, carved from the former Franciscan missions and at least 500 land grants awarded in the State's interior to Mexican citizens (Beck and Haase 1974; Staniford 1975). Captain John Sutter, who became a Mexican citizen, received the two largest land grants in the Sacramento Valley. In 1839, Sutter founded the trading and agricultural empire named New Helvetia that was headquartered at Sutter's Fort, near the confluence of the Sacramento and American Rivers in today's City of Sacramento (Hoover et al. 2002).

Following adoption of the Secularization Act of 1833, the Mexican government privatized most Franciscan lands, including holdings of their California missions. Although secularization schemes had called for redistribution of lands to Native American neophytes who were responsible for construction of the mission empire, the vast mission lands and livestock holdings were instead redistributed by the Mexican government through several hundred land grants to private, non-indigenous ranchers (Castillo 1978, Hoover et al. 2002). Most Native American converts returned to traditional lands that had not yet been colonized or found work with the large cattle ranchos being carved out of the mission lands.

American Period (1848–present)

In 1848, shortly after California became a territory of the United States with the signing of the Treaty of Guadalupe Hidalgo ending Mexican rule, gold was discovered on the American River at Sutter's Mill in Coloma. The resulting Gold Rush era influenced the history of the State, the nation, and the world. Thousands of people flocked to the gold fields in the Mother Lode region that stretches along the western foothills of the Sierra Nevada Mountains, and to the areas where gold was also discovered in other parts of the State, such as the Klamath and Trinity River basins (Caltrans 2008). In 1850, California became the 31st state, largely as a result of the Gold Rush.

Paleontological Setting

Statewide Overview

California's fossil record is exceptionally prolific with abundant specimens representing a diverse range of marine, lacustrine, and terrestrial organisms recovered from Precambrian rocks as old as 1 billion years to as recent as 6,000 year-old Holocene deposits (refer to geologic timescale in table 8). These fossils provide key data for charting the course of the evolution or extinction of a variety of life on the planet, both locally and internationally. Paleontological specimens also provide key evidence for interpreting paleo-environmental conditions, sequences and timing of sedimentary deposition, and other critical components of the earth's geologic history. Fossils are

considered our most significant link to the biological prehistory of the earth (Jefferson 2004).

Table 8: Divisions of Geologic Time			
Era	**Period**	**Time in Millions of Years Ago (approximately)**	**Epoch**
Cenozoic	Quaternary	< 0.01	Holocene
		2.6	Pleistocene
	Tertiary	5.3	Pliocene
		23	Miocene
		34	Oligocene
		56	Eocene
		65	Paleocene
Mesozoic	Cretaceous	145	
	Jurassic	200	
	Triassic	251	
Paleozoic	Permian	299	
	Carboniferous	359	
	Devonian	416	
	Silurian	444	
	Ordovician	488	
	Cambrian	542	
Precambrian		2,500	
Source: USGS Geologic Names Committee 2010			

Because the majority of the State was underwater until the Tertiary period, marine fossils older than 65 million years are not common and are exposed mainly in the mountains along the border with Nevada and the Klamath Mountains, and Jurassic shales, sandstones, and limestones are exposed along the edges of the Central Valley, portions of the Coast, Transverse, and Peninsular Ranges, and the Mojave and Colorado Deserts. Some of the oldest fossils in the State, extinct marine vertebrates called conodonts, have been identified at Anza-Borrego Desert SP in Ordovician sediments dating to circa 450 million years ago. Limestone outcrops of Pennsylvanian and Permian in the Providence Mountains SRA contain a variety of marine life, including brachiopods, fusulinids, crinoids, that lived some 300 to 250 million years ago.

Fossils from the Jurassic sedimentary layers in San Joaquin, San Luis Obispo, and Stanislaus counties include ammonites, bivalves, echinoderms and marine reptiles, all of which were common in the coastal waters. Gymnosperms (seed-bearing plants) such as cycads, conifers, and ginkgoes are preserved in terrestrial sediments from this period, evidence that the Jurassic climate was warm and moderately wet. In the great Central Valley, marine rocks record the position of the Cretaceous shoreline as the eroded ancestral Sierra Nevada sediments were deposited east of the rising Coast Ranges and became the rock layers of the Sacramento and San Joaquin valleys. These Cretaceous sedimentary deposits have yielded abundant fossilized remains of plants, bivalves, ammonites, and marine reptiles (Paleontology Portal 2003).

Along coastal southern California where steep coastal mountains plunged into the warm Pacific Ocean an abundance of fossil marine invertebrates, such as ammonites, nautilus, tropical snails and sea stars, have been found in today's coastal and near-coastal deposits from the Cretaceous Period. A rare armored dinosaur fossil dated to about 75 million years ago during the Cretaceous was discovered in San Diego County during a highway project. It is the most complete dinosaur skeleton ever found in California (San Diego Natural History Museum 2010). The lack of fossil remains of the majority of earth's large vertebrates, particularly terrestrial, marine, and flying reptiles (dinosaurs, ichthyosaurs, mosasaurs, pleisosaurs, and pterosaurs), as well as many species of terrestrial plants, after the end of the Cretaceous and the start of the Tertiary periods 65 million years ago (the K-T boundary) attests to their abrupt extinction.

Regulatory Setting

Table 9 describes the applicable laws and regulations for cultural resources associated with the Proposed Regulation.

Table 9: Applicable Laws and Regulations for Cultural Resources

Applicable Regulation	Description
Federal	
National Historic Preservation Act (NHPA) of 1966	The National Historic Preservation Act (NHPA) requires federal agencies to consider the preservation of historic and prehistoric resources. The Act authorizes the Secretary of the Interior to expand and maintain a National Register of Historic Places (NRHP), and it establishes an Advisory Council on Historic Preservation (ACHP) as an independent federal entity. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the ACHP a reasonable opportunity to comment on the undertaking prior to licensing or approving the expenditure of funds on any undertaking that may affect properties listed, or eligible for listing, in the NRHP.
National Environmental Policy Act (NEPA) of 1969	NEPA requires federal agencies to foster environmental quality and preservation. Section 101(b) (4) declares that one objective of the national environmental policy is to "preserve important historic,

Table 9: Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	**Description**
	cultural, and natural aspects of our national heritage." Foray major federal actions significantly affecting environmental quality, federal agencies must prepare, and make available for public comment, an environmental impact statement.
Archaeological Resources Protection Act of 1979 (ARPA)(16 USC 470aa-470II)	NRPA requires a permit for any excavation or removal of archaeological resources from public lands or Indian lands. The statute provides both civil and criminal penalties for violation of permit requirements and for excavation or removal of protected resources without a permit.
Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (PL 101–601)	NAGPRA vests ownership or control of certain human remains and cultural items, excavated or discovered on federal or tribal lands, in designated Native American tribes, organizations, or groups. The Act further: requires notification of the appropriate Secretary or other head of any federal agency upon the discovery of Native American cultural items on federal or tribal lands; proscribes trafficking in Native American human remains and cultural items; requires federal agencies and museums to compile an inventory of Native American human remains and associated funerary objects, and to notify affected Indian tribes of this inventory; and provides for the repatriation of Native American human remains and specified objects possessed or controlled by federal agencies or museums.
Advisory Council Regulation, Protection of Historic Properties (SHPO) (36 CFR 800)	Establishes procedures for compliance with Section 106 of the National Historic Preservation Act of 1966. These regulations define the Criteria of Adverse Effect, define the role of State Historic Preservation Officer (SHPO) in the Section 106 review process, set forth documentation requirements, and describe procedures to be followed if significant historic properties are discovered during implementation of an undertaking. Prehistoric and historic resources deemed significant (i.e., eligible for listing in the NRHP, per 36 CFR 60.4) must be considered in project planning and construction. The responsible federal agency must submit any proposed undertaking that may affect NRHP-eligible properties to the SHPO for review and comment prior to project approval.
National Park Service Regulations, National Register of Historic Places (NRHP) (36 CFR 60)	Sets forth procedures for nominating properties to the NRHP, and present the criteria to be applied in evaluating the eligibility of historic and prehistoric resources for listing in the NRHP.
Archaeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines (FR	Non-regulatory technical advice about the identification, evaluation, documentation, study, and other treatment of cultural resources. Notable in these Guidelines are the "Standards for Archaeological Documentation" (p. 44734) and "Professional Qualifications Standards for Archaeology" (pp. 44740–44741).

Table 9: Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	**Description**
190:44716–44742)	
American Indian Religious Freedom Act of 1978	The American Indian Religious Freedom Act pledges to protect and preserve the traditional religious rights of American Indians, Aleuts, Eskimos, and Native Hawaiians. Before the act was passed, certain U.S. federal laws interfered with the traditional religious practices of many American Indians. The Act establishes a national policy that traditional Native American practices and beliefs, sites (and right of access to those sites), and the use of sacred objects shall be protected and preserved.
Paleontological Resources Preservation Act (PRPA) of 2009	PRPA requires the U.S. Secretary of the Interior to manage and protect paleontological resources on federal public lands using scientific principals and expertise.
Department of Transportation Act of 1966, Section 4(f)	Section 4(f) of the Act requires a comprehensive evaluation of all environmental impacts resulting from federal-aid transportation projects administered by the FHA, FTA, and FAA that involve the use—or interference with use—of several types of land: public park lands, recreation areas, and publicly or privately owned historic properties of federal, state, or local significance. The Section 4(f) evaluation must be sufficiently detailed to permit the U.S. Secretary of Transportation to determine that there is no feasible and prudent alternative to the use of such land, in which case the project must include all possible planning to minimize harm to any park, recreation, wildlife and waterfowl refuge, or historic site that would result from the use of such lands. If there is a feasible and prudent alternative, a proposed project using Section 4(f) lands cannot be approved by the Secretary. Detailed inventories of the locations and likely impacts on resources that fall into the Section 4(f) category are required in project-level environmental assessments.
State	
AB 52 (2014), Tribal Cultural Resources	The legislature added new requirements for CEQA compliance regarding tribal cultural resources in Assembly Bill 52 (Gatto, 2014). By including tribal cultural resources early in the CEQA process, the legislature intended to ensure that local and Tribal governments, public agencies, and project proponents would have information available early in the process to identify and address potential adverse impacts to tribal cultural resources. AB 52 also includes procedural requirements for tribal consultation to resolve impacts to tribal cultural resources.
California Environmental Quality Act (CEQA) of 1970 (PRC Section 21000 et	Historical and archaeological resources are afforded consideration and protection by CEQA. The State CEQA Guidelines define significant cultural resources under two regulatory designations: historical resources and unique archaeological resources. Cultural

Table 9: Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	**Description**
seq.)	resources are defined as buildings, sites, structures, or objects, each of which may have historical, architectural, archaeological, cultural, and/or scientific importance.
California HSC and California PRC regarding discoveries of human remains	Disturbance of human remains without the authority of law is a felony (California HSC, Section 7052). According to State law (California HSC, Section 7050.5, California PRC, Section 5097.98), if human remains are discovered or recognized in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until 1) the coroner of the county has been informed and has determined that no investigation of the cause of death is required; 2)and if the remains are of Native American origin, and if the descendants from the deceased Native Americans have made a recommendation to the landowner or the person responsible for the excavation work for means of treating or disposing of with appropriate dignity the human remains and any associated grave goods as provided in PRC Section 5097.98; or the Native American Heritage Commission was unable to identify a descendent or the descendent failed to make a recommendation within 24 hours after being notified by the Commission. According to the California HSC, six or more human burials at one location constitute a cemetery (Section 8100), and disturbance of Native American cemeteries is a felony (Section 7052). Section 7050.5 requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must contact the Native American Heritage Commission, who has jurisdiction over Native American remains (California HSC, 7052.5c; PRC, Section 5097.98).
California Environmental Quality Act (Guidelines Section 15380)	CEQA requires that public agencies financing or approving public or private projects must assess the effects of the project on cultural resources. Furthermore, it requires that, if a project results in significant impacts on important cultural resources, alternative plans or mitigation measures must be considered; only significant cultural resources, however, need to be addressed. Thus, prior to the development of mitigation measures, the importance of cultural resources must be determined.
California Native American Graves Protection and Repatriation Act (2001)	Sections 8010 and 8011 of the HSC establish State policy that is consistent with the federal Native American Graves Protection and Repatriation Act and ensure that all Indian human remains and cultural items are treated with dignity and respect.
California Coastal Act of 1976 (PRC Sections	Defines archaeological sites “referenced in the California Coastline and Recreation Plan or as designated by the State Historic

Table 9: Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	**Description**
30116[d] and 30244)	Preservation Officer" as "sensitive coastal resource areas" (PRC Sections 30116[d]) and requires reasonable mitigation measures to be implemented where archaeological resources would be adversely impacted (PRC Section 30244).
Local	
City/County General Plans	Policies, goals, and implementation measures in county or city general plans may contain measures applicable to cultural and paleontological resources. In addition to the enactment of local and regional preservation ordinances, CEQA requires that resources included in local registers be considered (pursuant to section 5020.1(k) of the PRC).Therefore, local county and municipal policies, procedures, and zoning ordinances must be considered in the context of project-specific undertakings. Cultural resources are generally discussed in either the Open Space Element or the Conservation Element of the General Plan. Many local municipalities include cultural resources preservation elements in their general plans that include some mechanism pertaining to cultural resources in those communities. In general, the sections pertaining to archaeological and historical properties are put in place to afford the cultural resources a measure of local protection. The policies outlined in the individual general plans should be consulted prior to any undertaking or project.
Cooperative Agreements Among Agencies	Cooperative agreements among land managing agencies (BLM, National Park Service, U.S. Forest Services, California State Parks, Bureau of Indian Affairs, Department of Defense, to name a few) the SHPO and ACHP may exist and will need to be complied with on specific projects. In addition, certain agencies have existing Programmatic Agreements (PA) requiring permits (California Public Utilities Commission [CPUC], BLM) to complete archaeological investigations and employ the Secretary of Interior's Professional Qualification Standards and Guidelines (36 CFR 61).

6.0 ENERGY DEMAND

Existing Conditions

The major energy sources consumed in the United States are petroleum (oil), natural gas, coal, nuclear, and renewable energy. The major users are residential and commercial buildings, industry, transportation, and electric power generators. The pattern of fuel use varies widely by sector. For example, oil provides 93 percent of the energy used for transportation, but only about 1 percent of the energy used to generate electric power (U.S. EIA 2013a).

Excluding Federal offshore areas, California ranks third in the Nation in crude oil production and refining capacity in 2014. California ranks third in the Nation in conventional hydroelectric generation, first in net electricity generation from other renewable energy resources, and first as a producer of electricity from geothermal energy (in 2011). In 2010, California, with two nuclear power plants, ranked tenth in net electricity generation from nuclear power plants and eighth in nuclear net summer capacity. Average site electricity consumption in California homes is among the lowest in the nation (6.9 megawatt hours per year), according to EIA's Residential Energy Consumption Survey. In 2010, California's per capita energy consumption ranked 48th in the Nation, due in part to its mild climate and energy efficiency programs (EIA 2013b).

In 2010, California's in-state electricity generation sources consisted of: 53.4 percent natural gas, 15.7 percent nuclear, 14.6 percent large hydropower, 14.6 renewable sources, and 1.7 percent from coal. Approximately 71 percent of total electricity generation was from in-state sources, with the remaining electricity coming from out-of-state imports from the Pacific Northwest (8 percent) and the Southwest (21 percent). (CEC 2014a)

On the demand side, in 2010, Californians consumed 272,300 gigawatt hours (GWh) of electricity and 12,700 million therms of natural gas, primarily in the commercial, residential, and industrial sectors. A California Energy Commission (CEC) staff forecast of future energy demand shows that electricity consumption will grow by between 1.18 and 1.68 percent per year between 2012 and 2022; and natural gas consumption is expected to reach up to 14,175 million therms by 2022 for an annual average growth rate of up to 0.94 percent (CEC 2014b).

The CEC is the State's primary energy policy and planning agency. Six basic responsibilities guide the CEC as it sets state energy policy: forecasting future energy needs; promoting energy efficiency and conservation by setting the State's appliance and building efficiency standards; supporting public interest energy research that advances energy science and technology through research, development and demonstration programs; developing renewable energy resources and alternative renewable energy technologies for buildings, industry and transportation; licensing thermal power plants 50 megawatts or larger; and planning for and directing state response to energy emergencies. The CPUC also plays a key role in regulating investor-owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies. The CPUC regulates investor-owned electric and natural gas utilities operating in California, including Pacific Gas and Electric Company, Southern California Edison, San Diego Gas and Electric Company, and Southern California Gas Company.

Regulatory Setting

Table 10 describes the applicable laws and regulations for energy demand associated with the Proposed Regulation.

Table 10: Applicable Laws and Regulations for Energy Demand	
Regulation	**Description**
Federal	
Energy Policy and Conservation Act	The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the U.S. would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the United States. Pursuant to the Act, the National Highway Traffic and Safety Administration - part of the U.S. Department of Transportation (USDOT) - is responsible for establishing additional vehicle standards and for revising existing standards. Since 1990, the fuel economy standard for new passenger cars has been 27.5 mpg. Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 mpg. Heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) are not currently subject to fuel economy standards. Compliance with federal fuel economy standards is determined on the basis of each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the U.S. The Corporate Average Fuel Economy (CAFE) program, administered by the US EPA, was created to determine vehicle manufacturers' compliance with the fuel economy standards. The US EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, the USDOT is authorized to assess penalties for noncompliance.
Research and Special Programs Administration, U.S. Department of Transportation	The Research and Special Programs Administration is responsible for carrying out the duties regarding pipeline safety set forth in 49 USC Section 60101 et seq. and 49 CFR Section 190.1. The regulations apply to the owners and operators of the facilities and cover the design, installation, inspection, emergency plans and procedures, testing, construction, extension, operation, replacement, and maintenance of pipeline facilities transporting oil, gas, and hazardous liquid.
Energy Policy Act (EPAct) of 1992	EPAct was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.
Energy Policy Act of 2005	The Energy Policy Act of 2005 was signed into law on August 8, 2005. Generally, the act provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for

Table 10: Applicable Laws and Regulations for Energy Demand	
Regulation	**Description**
	a clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.
State	
Clean Energy and Pollution Reduction Act of 2015 (SB 350, Statues of 2015)	The Clean Energy and Pollution Reduction Act of 2015 requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources be increased to 50 percent by December 31, 2030. This act also requires doubling of the energy efficiency savings in electricity and natural gas for retail customers, through energy efficiency and conservation, by December 31, 2030.
Warren-Alquist State Energy Resources Conservation and Development Act of 1974	The Warren-Alquist Act is the legislation that created and gives statutory authority to the California Energy Commission (formally called the State Energy Resources Conservation and Development Commission).
Integrated Energy Policy Reports (SB 1389)	Senate Bill 1389 (Bowen, Chapter 568, Statutes of 2002) requires the California Energy Commission to prepare a biennial integrated energy policy report that contains an assessment of major energy trends and issues facing the State's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the State's economy; and protect public health and safety (Pub. Resources Code, § 25301,subd. (a)). The Energy Commission prepares these assessments and associated policy recommendations every two years, with updates in alternate years, as part of the Integrated Energy Policy Report (IEPR). Preparation of the IEPR involves close collaboration with federal, state, and local agencies and a wide variety of stakeholders in an extensive public process to identify critical energy issues and develop strategies to address those issues.
California Long-Term Energy Efficiency Strategic Plan	On Sept. 18, 2008, the CPUC adopted California's first Long Term Energy Efficiency Strategic Plan, presenting a single roadmap to achieve maximum energy savings across all major groups and sectors in California. This comprehensive Plan for 2009 to 2020 is the State's first integrated framework of goals and strategies for saving energy, covering government, utility, and private sector actions, and holds energy efficiency to its role as the highest priority resource in meeting California's energy needs. The plan was updated in January 2011 to include a lighting chapter.
California Building Energy Efficiency Standards (CCR	California's Building Energy Efficiency Standards (Title 24, Part 6 of the California Code of Regulations) conserve electricity and natural gas in new building construction and are administered by the CEC. Local

Table 10: Applicable Laws and Regulations for Energy Demand	
Regulation	**Description**
Title 24, Part 6)	governments enforce the standards through local building permitting and inspections. The CEC has updated these standards on a periodic basis. The new 2013 Building Energy Efficiency Standards, which take effect on January 1, 2014, are 25 percent more efficient than previous standards for residential construction and 30 percent more efficient for nonresidential construction.
Comprehensive Energy Efficiency Plan for Existing Buildings (AB 758)	Assembly Bill 758 (Skinner, Chapter 470, Statutes 2009) requires the CEC, in collaboration with the CPUC and stakeholders, to develop a comprehensive program to achieve greater energy efficiency in the State's existing buildings.
California Renewable Energy Portfolio Standard (RPS) (SB X1-2)	In 2011, Governor Brown signed SB X1-2 (Smitian, Chapter 1, Statutes of 2011), which requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 33 percent of their electricity supply (portfolio) from renewable sources by 2020 (which has since been updated to 50 percent by 2030 with enactment of SB 350 [Statutes of 2015], noted previously). The CPUC and the CEC jointly implement the Statewide RPS program through rulemakings and monitoring the activities of electric energy utilities in the state. The Clean Energy and Pollution Reduction Act of 2015 (see above) requires that renewable energy resources are increased to 50 percent by December 31, 2030.
California Qualifying Facility and Combined Heat and Power Program Settlement	In December 2010, the CPUC approved California's Qualifying Facility and Combined Heat and Power Program Settlement, which established a CHP framework for the State's investor-owned utilities. The settlement established a near-term target of 3,000 megawatts (MW) of CHP for entities under the jurisdiction of the CPUC, although this target includes not just new CHP, but capacity from renewal of contracts due to expire in the next three years. The CPUC has also adopted a settlement agreement that includes reforms to the Rule 21 interconnection process to provide a clear, predictable path to interconnection of distributed generation while maintaining the safety and reliability of the grid.
California Appliance Efficiency Regulations (CCR, Title 20)	California's Appliance Efficiency Regulations, enacted in 1976, requires that certain appliances meet efficiency standards. Each appliance must be tested and the results certified by the CEC in order for a product can be sold in California.
Alternative and Renewable Fuel and Vehicle Technology Program	Assembly Bill 118 (Nunez, Chapter 750, Statutes of 2007) created the California Energy Commission's Alternative and Renewable Fuel and Vehicle Technology Program. The statute, subsequently amended by Assembly Bill 109 (Statues of 2008), authorizes the CEC to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the State's climate change policies.
California Strategy to Reduce Petroleum	Assembly Bill 2076 (Chapter 936, Statutes of 2000) requires the CEC and the ARB to develop and submit to the Legislature a strategy to

Table 10: Applicable Laws and Regulations for Energy Demand	
Regulation	**Description**
Dependence (AB 2076)	reduce petroleum dependence in California. The statute requires the strategy to include goals for reducing the rate of growth in the demand for petroleum fuels. In addition, the strategy is required to include recommendations to increase transportation energy efficiency as well as the use of non-petroleum fuels and advanced transportation technologies including alternative fuel vehicles, hybrid vehicles, and high-fuel efficiency vehicles. The strategy, *Reducing California's Petroleum Dependence*, was adopted by the CEC and ARB in 2003. The strategy recommends that California reduce inroad gasoline and diesel fuel demand to 15 percent below 2003 demand levels by 2020 and maintain that level for the foreseeable future; the Governor and Legislature work to establish national fuel economy standards that double the fuel efficiency of new cars, light trucks, and sport utility vehicles; and increase the use of nonpetroleum fuels to 20 percent of on-road fuel consumption by 2020 and 30 percent by 2030.
Alternative Fuels Plan	Assembly Bill 1007 requires the CEC to prepare a state plan to increase the use of alternative fuels in California. Any environmental document prepared for a strategic growth plan, regional blueprint general plan metropolitan planning or transportation plan should include an evaluation of alternative fuels for emissions or criteria pollutants, TACs, GHGs, water pollutants, and other harmful substances, and their impacts on petroleum consumption, and set goals for increased alternative fuel use in the state for the next decades, and recommend policies to ensure the alternative fuel goals are attained, including standards on transportation fuels and vehicle and policy mechanisms to ensure vehicles operating on alternative fuels use those fuels to the maximum extent feasible.
Bioenergy Action Plan (Executive Order S-06-06)	Executive Order #S-06-06 establishes targets for the use and production of biofuels and biopower and directs state agencies to work together to advance biomass programs in California while providing environmental protection and mitigation. This executive order establishes the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050. The Executive Order also calls for the state to meet a target for use of biomass electricity.
Governor's Low Carbon Fuel Standard (Executive Order S-01-07)	Executive Order #S-01-07 establishes a statewide goal to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 through establishment of the LCFS. The executive order requires LCFS to be incorporated into the State Alternative Fuels Plan required by AB 1007 and is one of the proposed discrete early action GHG reduction measures identified by CARB pursuant to AB 32. In January, 2010, the Office of Administrative Law approved the LCFS regulation. An amended versions was approved in 2014.

Table 10: Applicable Laws and Regulations for Energy Demand	
Regulation	**Description**
Local	
City/County General Plans	Many cities and counties have general plan elements and policies that specifically address energy use and conservation. Those energy conservation measures outlined in the various county and city general plans contain goals, objectives, and policies aimed at reducing energy consumption. Proponents of specific projects would be required to consult the applicable general plans and design the projects consistent with the guidelines of those general plans in which the projects are located.

7.0 GEOLOGY AND SOILS

Existing Conditions

The State's topography is highly varied and includes 1,340 miles of seacoast, as well as high mountains, inland flat valleys, and deserts. Elevations in California range from 282 feet below sea level in Death Valley to 14,494 feet at the peak of Mount Whitney. The mean elevation of California is approximately 2,900 feet. The climate of California is as highly varied as its topography. Depending on elevation, proximity to the coast, and altitude, climate types include temperate oceanic, highland, sub-arctic, Mediterranean, steppe, and desert (USGS 1995). The average annual precipitation across all California climate types is approximately 23 inches and approximately 75 percent of the State's annual precipitation falls between November and March, primarily in the form of rain, with the exception of high mountain elevations (DWR 2003). Average annual precipitation ranges from more than 100 inches in the mountainous areas within the Smith River in Del Norte County to less than 2 inches in Death Valley, illustrating the extreme differences in precipitation levels within the State (Mount 1995). Overall, northern California is wetter than southern California with the majority of the State's annual precipitation occurring in the northern coastal region.

Geology

Plate tectonics and climate have played major roles in forming California's dramatic landscape. California is located on the active western boundary of the North American continental plate in contact with the oceanic Pacific Plate and the Gorda Plate north of the Mendocino Triple Junction. The dynamic interactions between these three plates and California's climate are responsible for the unique topographic characteristics of California, including rugged mountain ranges, long and wide flat valleys, and dramatic coastlines (Harden 1997). Tectonics and climate also have a large effect on the occurrence natural environmental hazards, such as earthquakes, landslides, and volcanic formations.

Landslides

Landsliding or mass wasting is a common erosional process in California and has played an integral part in shaping the State's landscape. Typically, landslides occur in mountainous regions of the State, but they can also occur in areas of low relief, including coastal bluffs, along river and stream banks, and inland desert areas. Landsliding is the gravity-driven downhill mass movement of soil, rock, or both and can vary considerably in size, style and rate of movement, and type depending on the climate of a region, the steepness of slopes, rock type and soil depth, and moisture regime (Harden 1997).

Earthquakes

Earthquakes are a common and unpredictable occurrence in California. The tectonic development of California began millions of years ago by a shift in plate tectonics that converted the passive margin of the North American plate into an active margin of compressional and translational tectonic regimes. This shift in plate tectonics continues to make California one of the most geomorphically diverse, active, and picturesque locations in the U.S. While some areas of California are more prone to earthquakes, such as northern, central, and southern coastal areas of California, all areas of California are prone to the effects of ground shaking due to earthquakes. While scientists have made substantial progress in mapping earthquake faults where earthquakes are likely to occur, and predicting the potential magnitude of an earthquake in any particular region, they have been unable to precisely predict where or when an earthquake will occur and what its magnitude will be.

Tsunamis

Coastal communities around the circum Pacific have long been prone to the destructive effects of tsunamis. Tsunamis are a series of long-period, high-magnitude ocean waves that are created when an outside force displaces large volumes of water. Throughout time, major subduction zone earthquakes in both the Northern and Southern Hemispheres have moved the Earth's crust at the ocean bottom sending vast amounts of waters into motion and spreading tsunami waves throughout the Pacific Ocean.

Tsunamis can also occur from subareal and submarine landslides that displace large volumes of water. Subaeral landslide-generated tsunamis can be caused by seismically generated landslides, rock falls, rock avalanches, and eruption or collapse of island or coastal volcanoes. Submarine landslide-generated tsunamis are typically caused by major earthquakes or coastal volcanic activity. In contrast to a seismically generated tsunami, seismic seiches are standing waves that are caused by seismic waves traveling through a closed (lake) or semi-enclosed (bay) body of water. Due to the long-period seismic waves that originate after an earthquake, seiches can be observed several thousand miles away from the origin of the earthquakes. Small bodies of water, including lakes and ponds, are especially vulnerable to seismic seiches.

Volcanoes

A volcano is an opening in the Earth's crust through which magma escapes to the surface where it is extruded as lava. Volcanism may be spectacular, involving great fountains of molten rock, or tremendous explosions that are caused by the build-up of gases within the volcano (Ritchie and Gates 2001). Some of the most active volcanic areas in California are located within the Cascade Range - a volcanic chain that is a result of compressional tectonics along the Cascadia subduction zone.

Active Faults

A fault is defined as a fracture or zone of closely associated fractures along rocks that on one side have been displaced with respect to those on the other side. Most faults are the result of repeated displacement that may have taken place suddenly or by slow creep. A fault is distinguished from fractures or shears caused by landsliding or other gravity-induced surficial failures. A fault zone is a zone of related faults that commonly are braided and subparallel, but may be branching and divergent. A fault zone has significant width (with respect to the scale of the fault being considered, portrayed, or investigated), ranging from a few feet to several miles (Bryant and Hart 2007).

In the State of California earthquake faults have been designated as being active through a process that has been described by the1972 Alquist-Priolo Earthquake Fault Zoning Act. An active fault is defined by the State as one that has "had surface displacement within Holocene time (about the last 11,000 years)." This definition does not, of course, mean that faults lacking evidence for surface displacement within Holocene time are necessarily inactive. A fault may be presumed to be inactive based on satisfactory geologic evidence; however, the evidence necessary to prove inactivity sometimes is difficult to obtain and locally may not exist.

Regulatory Setting

Table 11 describes the applicable laws and regulations for geology and soils associated with the Proposed Regulation.

Table 11: Applicable Laws and Regulations for Geology and Soils

Regulation	Description
Federal	
Safe Drinking Water Act - Federal Underground Injection Control Class II Program for Oil and Gas Related Injection Wells	The Class II Program for Oil and Gas Related Injection Wells requires states to meet EPA's minimum requirements for UIC programs including strict construction and conversion standards and regular testing and inspection. Enhanced oil and gas recovery wells may either be issued permits or be authorized by rule. Disposal wells are issued permits.
Clean Water	This law was enacted to restore and maintain the chemical, physical, and

Table 11: Applicable Laws and Regulations for Geology and Soils	
Regulation	**Description**
Act/National Pollutant Discharge Elimination System	biological integrity of the nation's waters by regulating point and nonpoint pollution sources, providing assistance to publicly owned treatment works for the improvement of wastewater treatment, and maintaining the integrity of wetlands. This includes the creation of a system that requires states to establish discharge standards specific to water bodies (National Pollution Discharge Elimination System [NPDES]), which regulates storm water discharge from construction sites through the implementation of a Storm Water Pollution Prevention Plan (SWPPP). In California, the State's NPDES permit program is implemented and administered by the local Regional Water Quality Control Boards.
Earthquake Hazards Reduction Act and National Earthquake Hazards Reduction Program Act	This Act established the National Earthquake Hazards Reduction Program to reduce the risks to life and property from future earthquakes. This program was significantly amended in November 1990 by the National Earthquake Hazards Reduction Program Act by refining the description of agency responsibilities, program goals and objectives.
State	
Seismic Hazards Mapping Act, PRC Section 2690–2699.	The Seismic Hazards Mapping Act (the Act) of 1990 (PRC, Chapter 7.8, Division 2) directs the California DOC, Division of Mines and Geology (now called California Geological Survey [CGS]) to delineate Seismic Hazard Zones. The purpose of the Act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards. These include areas identified that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches. Cities, counties, and state agencies are directed to use seismic hazard zone maps developed by CGS in their land-use planning and permitting processes. The Act requires that site-specific geotechnical investigations be performed prior to permitting most urban development projects within seismic hazard zones.
Alquist-Priolo Earthquake Fault Zoning Act	California's Alquist-Priolo Act (PRC 2621 et seq.), originally enacted in 1972 as the Alquist-Priolo Special Studies Zones Act and renamed in 1994, is intended to reduce the risk to life and property from surface fault rupture during earthquakes. The Alquist-Priolo Act prohibits the location of most types of structures intended for human occupancy across the traces of active faults and strictly regulates construction in the corridors along active faults (Earthquake Fault Zones). It also defines criteria for identifying active faults, giving legal weight to terms such as "active," and establishes a process for reviewing building proposals in and adjacent to Earthquake Fault Zones. Under the Alquist-Priolo Act, faults are zoned, and construction along or across them is strictly regulated if they are "sufficiently active" and "well-defined." A fault is considered sufficiently active if one or more of its segments or strands shows evidence of

Table 11: Applicable Laws and Regulations for Geology and Soils	
Regulation	**Description**
	surface displacement during Holocene time (defined for the purposes of the act as within the last 11,000 years). A fault is considered well-defined if its trace can be clearly identified by a trained geologist at the ground surface or in the shallow subsurface, using standard professional techniques, criteria, and judgment.
California Division of Oil, Gas, and Geothermal Resources (DOGGR), PRC Section 3106.	PRC Section 3106 mandates the supervision of drilling, operation, maintenance, and abandonment of oil wells for the purpose of preventing: damage to life, health, property, and natural resources; damage to underground and surface waters suitable for irrigation or domestic use; loss of oil, gas, or reservoir energy; and damage to oil and gas deposits by infiltrating water and other causes. In addition, DOGGR regulates drilling, production, injection, and gas storage operations in accordance with CCR Title 14, Chapter 4, Subchapter 1. With the passage of Senate Bill 4 (Pavley, Statutes of 2013), DOGGR was established as the lead agency for defining permitting and reporting requirements for well stimulation treatments.
California Geological Survey (CGS)	Formerly the California Division of Mines & Geology, CGS provides scientific products and services regarding the state's geology, seismology and mineral resources that affect the health, safety, and business interests of the people of California. The California Geological Survey serves under contract with the Division of the State Architect and the Office of Statewide Health, Planning, and Development to provide technical advice and information.
State and Surface Mining and Reclamation Act (SMARA) of 1975	California's SMARA was enacted to provide a comprehensive surface mining and reclamation policy that encourages the production and conservation of mineral resources while ensuring that adverse environmental effects of mining are prevented or minimized; that mined lands are reclaimed to a usable condition; residual hazards to public health and safety are eliminated; and consideration is given to recreation, watershed, wildlife, aesthetic, and other related values.
Landslide Hazard Identification Program, PRC Section 2687(a)	The Landslide Hazard Identification Program requires the State Geologist to prepare maps of landslide hazards within urbanizing areas. According to PRC Section 2687(a), public agencies are encouraged to use these maps for land use planning and for decisions regarding building, grading, and development permits.
California Building Standards Code (CBSC) (CCR Title 24)	California's minimum standards for structural design and construction are given in the CBSC (CCR Title 24). The CBSC is based on the Uniform Building Code, which is used widely throughout United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed or more stringent regulations. The CBSC provides standards for various aspects of construction, including (i.e., not limited to) excavation, grading, and earthwork construction; fills and embankments; expansive soils;

Table 11: Applicable Laws and Regulations for Geology and Soils	
Regulation	**Description**
	foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, proponents of specific projects would be required to comply with all provisions of the CBSC for certain aspects of design and construction.
California Department of Transportation (Caltrans) Seismic Design Criteria (SDC)	Caltrans' SDC is an encyclopedia of new and currently practiced seismic design and analysis methodologies for the design of new bridges in California. The SDC adopts a performance-based approach specifying minimum levels of structural system performance, component performance, analysis, and design practices for ordinary standard bridges. The SDC has been developed with input from the Caltrans Offices of Structure Design, Earthquake Engineering and Design Support, and Materials and Foundations. Memo 20-1 outlines the bridge category and classification, seismic performance criteria, seismic design philosophy and approach, seismic demands and capacities on structural components and seismic design practices that collectively make up Caltrans' seismic design methodology.
Local	
Geotechnical Investigation	Local jurisdictions typically regulate construction activities through a process that may require the preparation of a site-specific geotechnical investigation. The purpose of a site-specific geotechnical investigation is to provide a geologic basis for the development of appropriate construction design. Geotechnical investigations typically assess bedrock and Quaternary geology, geologic structure, soils, and the previous history of excavation and fill placement. Proponents of specific projects that require design of earthworks and foundations for proposed structures will need to prepare geotechnical investigations on the physical properties of soil and rock at the site prior to project design.
Local Grading and Erosion Control Ordinances	Many counties and cities have grading and erosion control ordinances. These ordinances are intended to control erosion and sedimentation caused by construction activities. A grading permit is typically required for construction-related projects. As part of the permit, project applicants usually must submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit include a description of Best Management Practices (BMPs) similar to those contained in a SWPPP.
County General Plans (and EIR)	Some county General Plans provide a regulatory framework to address potential environmental impacts that may result from a proposed project. These include the General Plans for Solano, San Luis Obispo, Los Angeles, Kern, San Bernardino, Riverside, and Imperial counties.
City/County General Plans	Most city and county general plans include an element that covers geology and soil resources within that jurisdiction.

8.0 GREENHOUSE GASES

Existing Conditions

The Physical Scientific Basis of Climate Change

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space. A portion of the radiation is absorbed by the earth's surface and a smaller portion of this radiation is reflected back toward space. This absorbed radiation is then emitted from the earth as low-frequency infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. The earth has a much lower temperature than the sun; therefore, the earth emits lower frequency radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate on earth.

Prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Human-caused emissions of these GHGs in excess of natural ambient concentrations are believed responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is "extremely likely" that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic causes of climate change together (Intergovernmental Panel on Climate Change [IPCC] 2014).

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about one day), GHGs have long atmospheric lifetimes (one to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Although the lifetime of any particular GHG molecule is dependent on multiple variables and cannot be determined with any certainty, it is understood that more CO_2 is emitted into the atmosphere than is sequestered by ocean uptake, vegetation, and other forms of sequestration. Of the total annual human-caused CO_2 emissions, approximately 55 percent is sequestered through ocean and land uptake every year, averaged over the last 50 years, whereas the remaining 45 percent of human-caused CO_2 emissions remains stored in the atmosphere (IPCC 2013).

The quantity of GHGs in the atmosphere that ultimately result in climate change is not precisely known, but is enormous; no single project alone would measurably contribute to an incremental change in the global average temperature, or to global, local, or micro

climates. From the standpoint of CEQA, GHG impacts relative to global climate change are inherently cumulative.

Greenhouse Gas Emission Sources

GHG emissions are attributable in large part to human activities associated with the transportation, industrial/manufacturing, utility, residential, commercial, and agricultural emissions sectors. In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation (ARB 2015b). Emissions of CO_2 are byproducts of fossil fuel combustion. Methane, or CH_4, is a highly potent GHG that primarily results from escaped emissions of natural gas and from anaerobic decomposition of organic substances in agricultural practices and landfills. N_2O is also largely attributable to agricultural practices and soil management. CO_2 sinks, or reservoirs, include vegetation and the ocean, which absorb CO_2 through sequestration and dissolution (CO_2 dissolving into the water), respectively, two of the most common processes for removing CO_2 from the atmosphere.

Effects of Climate Change on the Environment

The IPCC was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to provide the world with a scientific view on climate change and its potential effects. According to the IPCC global average temperature is expected to increase relative to the 1986-2005 period by 0.3–4.8 degrees Celsius (°C) (0.5-8.6 degrees Fahrenheit [°F]) by the end of the 21st century (2081-2100), depending on future GHG emission scenarios (IPCC 2014). According to the California Natural Resources Agency, temperatures in California are projected to increase 2.7°F above 2000 averages by 2050 and, depending on emission levels, 4.1–8.6°F by 2100 (California Natural Resources Agency [CNRA] 2012).

Physical conditions beyond average temperatures could be affected by the accumulation of GHG emissions. For example, changes in weather patterns resulting from increases in global average temperature are expected to result in a decreased volume of precipitation falling as snow in California and an overall reduction in snowpack in the Sierra Nevada. Based upon historical data and modeling, the California Department of Water Resources (DWR) projects that the Sierra snowpack will decrease by 25 to 40 percent from its historic average by 2050 (DWR 2008). An increase in precipitation falling as rain rather than snow also could lead to increased potential for floods because water that would normally be held in the Sierra Nevada until spring could flow into the Central Valley concurrently with winter storm events (CNRA 2012). This scenario would place more pressure on California's levee/flood control system.

Another outcome of global climate change is sea level rise. Sea level rose approximately seven inches during the last century and, assuming that sea-level changes along the California coast continue to reflect global trends, sea level along the state's coastline in 2050 could be 10-18 inches higher than in 2000, and 31-55 inches higher by the end of this century (CNRA 2012).

As the existing climate throughout California changes over time, the ranges of various plant and wildlife species could shift or be reduced, depending on the favored temperature and moisture regimes of each species. In the worst cases, some species would become extinct or be extirpated from the state if suitable conditions are no longer available (CNRA 2012).

Changes in precipitation patterns and increased temperatures are expected to alter the distribution and character of natural vegetation and associated moisture content of plants and soils. An increase in frequency of extreme heat events and drought are also expected. These changes are expected to lead to increased frequency and intensity of large wildfires (CNRA 2012).

Regulatory Setting

Table 12 describes the applicable laws and regulations for Greenhouse Gases associated with the Proposed Regulation. It should be noted that other laws and regulations described under Energy Demand in this Environmental Setting would also reduce GHG emissions.

Table 12: Applicable Laws and Regulations for Greenhouse Gases

Regulation	Description
Federal	
Mandatory Greenhouse Gas Reporting Rule	On September 22, 2009, U.S. EPA issued a final rule for mandatory reporting of GHGs from large GHG emissions sources in the United States. In general, this national reporting requirement will provide U.S. EPA with accurate and timely GHG emissions data from facilities that emit 25,000 metric tons or more of CO_2 per year. This publically available data will allow the reporters to track their own emissions, compare them to similar facilities, and aid in identifying cost effective opportunities to reduce emissions in the future. Reporting is at the facility level, except that certain suppliers of fossil fuels and industrial greenhouse gases along with vehicle and engine manufacturers will report at the corporate level. An estimated 85 percent of the total U.S. GHG emissions, from approximately 10,000 facilities, are covered by this final rule.
National Program to Cut Greenhouse Gas Emissions and Improve Fuel Economy for Cars and Trucks	The National Program for greenhouse gas emissions (GHG) and fuel economy standards was developed jointly by the Environmental Protection Agency (EPA) and the National Highway Traffic Safety Administration (NHTSA) and applies to light duty cars and trucks, and is being implemented over two phases. The first phase of the program applies to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016; and, the second phase establishes 2017-2025 GHG emission and average fuel economy standards for light-duty vehicles. These standards are projected to result in an average industry fleetwide level of 163 grams/mile of CO_2 in model year

Table 12: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
	2025, which is equivalent to 54.5 miles per gallon (mpg) if achieved exclusively through fuel economy improvements.
Clean Air Act/ Endangerment and Cause or Contribute Findings	On December 7, 2009, U.S. EPA adopted its Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the CAA (Endangerment Finding). The Endangerment Finding is based on Section 202(a) of the CAA, which states that the Administrator (of US EPA) should regulate and develop standards for "emission[s] of air pollution from any class of classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." The rule addresses Section 202(a) in two distinct findings. The first addresses whether or not the concentrations of the six key GHGs (i.e., carbon dioxide [CO_2], methane [CH_4], nitrous oxide [N_2O], hydrofluorocarbons [HFCs], perfluorocarbons [PFCs], and sulfur hexafluoride [SF_6]) in the atmosphere threaten the public health and welfare of current and future generations. The second addresses whether or not the combined emissions of GHGs from new motor vehicles and motor vehicle engines contribute to atmospheric concentrations of GHGs and therefore the threat of climate change. The Administrator found that atmospheric concentrations of GHGs endanger the public health and welfare within the meaning of Section 202(a) of the CAA. The evidence supporting this finding consists of human activity resulting in "high atmospheric levels" of GHG emissions, which are very likely responsible for increases in average temperatures and other climatic changes. Furthermore, the observed and projected results of climate change (e.g., higher likelihood of heat waves, wild fires, droughts, sea level rise, higher intensity storms) are a threat to the public health and welfare. Therefore, GHGs were found to endanger the public health and welfare of current and future generations. The Administrator also found that GHG emissions from new motor vehicles and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. U.S. EPA's final findings respond to the 2007 U.S. Supreme Court decision that GHGs fit within the CAA definition of air pollutants. These findings do not impose any requirements on industry or other entities; however, this action is a prerequisite for implementing greenhouse gas emissions standards for vehicles. In collaboration with the National Highway Traffic Safety Administration, EPA finalized emission standards for light-duty vehicles (2012-2016 model years) in May of 2010 and heavy-duty vehicles (2014-2018 model years) in August of 2011.
U.S.EPA Air Permits Programs and	The U.S. EPA Prevention of Significant Deterioration (PSD) Program under the CAA and implementing regulations (40 CFR 51 & 52) require

Table 12: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
Standards	review of CO_2 emission control strategies for any new or modified stationary source that emits more than 100,000 tons per year of GHG. Lower thresholds can also trigger PSD review of CO_2 control technologies for large stationary sources that would otherwise be subject to the PSD program for other criteria air pollutants. In 2012, U.S. EPA adopted New Source Performance Standards (NSPS) under CAA Section 111, Subpart OOOO that were designed to control criteria air pollutants from natural gas well completions. However in the preamble to the rule, U.S. EPA recognized that the controls would also reduce CH_4 from the oil and gas industry.
U.S. EPA Natural Gas STAR Program	U.S. EPA manages Natural Gas STAR, which is a voluntary program that encourages oil and natural gas companies to adopt cost-effective technologies and practices to improve operational efficiency and prevent emissions of methane and defines protocols for methane control at natural gas production facilities.
The Clean Power Plan for Existing Power Plants and the Carbon Pollution Standards for New Power Plants (Clean Air Act sections 111(b) and 111(d))	On August 3, 2015, President Obama and EPA announced the Clean Power Plan. In this action, U.S. EPA established emission guidelines for states to follow in developing plans to reduce GHG emissions from existing fossil fuel-fired electric generating units (EGUs). Specifically, the EPA is establishing: CO_2 emission performance rates representing the best system of emission reduction for two subcategories of existing fossil fuel fired EGUs (fossil fuel-fired electric utility steam generating units and stationary combustion turbines); state- specific CO_2 goals reflecting the CO_2 emission performance rates; and guidelines for the development, submittal and implementation of state plans that establish emission standards or other measures to implement the CO_2 emission performance rates, which may be accomplished by meeting the state goals.
State	
Executive Order B-30-15	Under Executive Order B-30-15, Governor Brown announced that, by 2030, California will increase electricity derived from renewable sources from 30 to 50 percent; reduce petroleum use in cars and trucks by up to 50 percent; double the efficiency savings from existing buildings and make heating fuels cleaner; reduce the release of methane, black carbon and other potent pollutants across industries; and manage farm and rangelands, forests and wetlands so they can store carbon. The executive order also directed state agencies to achieve an interim greenhouse gas

Table 12: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
	target of 40 percent below 1990 levels by 2030.
Executive Order S-3-05	Executive Order S-3-05, signed by former Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the Executive Order established total greenhouse gas emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050. The Executive Order directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce greenhouse gas emissions to the target levels. The Secretary will also submit biannual reports to the governor and state legislature describing: progress made toward reaching the emission targets; impacts of global warming on California's resources; and mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the Secretary of the Cal/EPA created the Climate Action Team (CAT) made up of members from various state agencies and commission. CAT released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.
Senate Bill 605, Short-Lived Climate Pollutants	Complete an inventory of sources and emissions of short-lived climate pollutants in the state based on available data. Identify research needs to address any data gaps. Identify existing and potential new control measures to reduce emissions. (4) Prioritize the development of new measures for short-lived climate pollutants that offer co-benefits by improving water quality or reducing other air pollutants that impact community health and benefit disadvantaged communities, as identified pursuant to Section 39711. (5) Coordinate with other state agencies and districts to develop measures identified as part of the comprehensive strategy.
Assembly Bill 32 (AB 32), the California Global Warming Solutions Act, Statutes of 2006	In September 2006, former Governor Arnold Schwarzenegger signed AB 32, the California Global Warming Solutions Act of 2006. AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs ARB to develop and implement regulations to reduce statewide GHG emissions

Table 12: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
	from substantial stationary and mobile source categories. Requires ARB to produce a Scoping Plan by January 1, 2009 and at least every five years afterwards that details how the State will meet its GHG reduction targets. AB 32 requires that ARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves the reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.
Mandatory GHG Reporting	California Health and Safety Code Section 38530 requires ARB to establish regulations for reporting and verification of statewide GHG emissions, for the categories of sources that contribute the most to statewide emissions. The ARB Regulation for the Mandatory Reporting of Greenhouse Gas Emissions, first approved in 2007 and subsequently updated, applies to entities within certain regulated source categories, including sources related to “Petroleum and Natural Gas Systems” [CCR Section 95150], if calendar year combustion or process emissions for the facility exceed 10,000 MTCO2e per calendar year or if stationary combustion, process, fugitive, and vented emissions equal or exceed 25,000 MTCO2e or more per year [CCR Section 95151].
Assembly Bill 1493, Statutes of 2002	In September 2004, ARB approved regulations to reduce GHG emissions from new motor vehicles. The Board took this action pursuant to Chapter 200, Statutes of 2002 (AB 1493, Pavley) which directed the Board to adopt regulations that achieve the maximum feasible and cost effective reduction in greenhouse gas emissions from motor vehicles. The regulations, which took effect in 2006 following an opportunity for legislative review, apply to new passenger vehicles and light duty trucks beginning with the 2009 model year.
Executive Order B-16-2012	Executive Order B-16-2012, signed by Governor Brown in 2012, reaffirms California’s commitment to reducing GHGs from the transportation sector by establishing a transportation specific 2050 target of an 80 percent reduction in GHGs from 1990 levels. The Executive Order also calls for 2020 and 2025 benchmarks to ensure commercialization and integration of zero emission cars and trucks into the California vehicle fleet.
Executive Order S-1-07	Executive Order S-1-07, which was signed by former Governor Schwarzenegger in 2007, proclaims that the transportation sector is the main source of GHG emissions in California, at over 40 percent of statewide emissions. It establishes a goal that the carbon intensity of transportation fuels sold in California should be reduced by a minimum of 10 percent by 2020. This order also directed ARB to determine if this Low

Table 12: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
	Carbon Fuel Standard (LCFS) could be adopted as a discrete early action measure after meeting the mandates in AB 32. The Board approved the LCFS on April 23, 2009 and re-adopted an updated LCFS on February 19, 2015.
Senate Bill 1368, Statutes of 2006	SB 1368 is the companion bill of AB 32 and was signed by former Governor Schwarzenegger in September 2006. SB 1368 requires the CPUC to establish a GHG emission performance standard for baseload generation from investor owned utilities by February 1, 2007. The CEC must establish a similar standard for local publicly owned utilities by June 30, 2007. These standards cannot exceed the greenhouse gas emission rate from a baseload combined-cycle natural gas fired plant. The legislation further requires that all electricity provided to California, including imported electricity, must be generated from plants that meet the standards set by the CPUC and CEC.
Senate Bill 1078, Statutes of 2002, Senate Bill 107, Statutes of 2006, and SBx1 2	SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010. In 2010, SBx1 2 was chaptered, which expanded the State's Renewable Portfolio Standard to 33 percent renewable power by 2020.
Senate Bill 97, Statutes of 2007	As directed by SB 97, on December 30, 2009 the Natural Resources Agency adopted certain amendments to the State CEQA Guidelines for reviewing the environmental impacts of greenhouse gas emissions. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.
Senate Bill 375, Statutes of 2008	SB 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's Regional Transportation Plan (RTP). ARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every 8 years, but can be updated every 4 years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012.

Table 12: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
	This bill also extends the minimum time period for the Regional Housing Needs Allocation (RNHA) cycle from 5 years to 8 years for local governments located within an MPO that meets certain requirements. City or County land use policies (including General Plans) are not required to be consistent with the RTP (and associated SCS or APS). However, new provisions of CEQA would incentivize qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."
Executive Order S-13-08	Sea level rise is a foreseeable indirect environmental impact associated with climate change, largely attributable to thermal expansion of the oceans and melting polar ice. As discussed above in the environmental setting (subheading "Adaptation to Climate Change"), sea level rise presents impacts to California associated with coastal erosion, water supply, water quality, saline-sensitive species and habitat, land use compatibility, and flooding. Former Governor Arnold Schwarzenegger signed Executive Order S-13-08 on November 14, 2008. This executive order directed the California Natural Resources Agency (CNRA) to develop the 2009 California Climate Adaptation Strategy, which summarizes the best known science on climate change impacts in seven distinct sectors—public health, biodiversity and habitat, ocean and coastal resources, water management, agriculture, forest resources, and transportation and energy infrastructure—and provides recommendations on how to manage against those threats. This executive order also directed OPR, in cooperation with the CNRA, to provide land use planning guidance related to sea level rise and other climate change impacts by May 30, 2009, which is also provided in the 2009 California Climate Adaptation Strategy (CNRA 2009) and OPR continues to further refine land use planning guidance related to climate change impacts. Executive Order S-13-08 also directed CNRA to convene an independent panel to complete the first California Sea Level Rise Assessment Report. This report is to be completed no later than December 1, 2010. The report is intended to provide information on the following: • relative sea level rise projections specific to California, taking into account issues such as coastal erosion rates, tidal impacts, El Niño and La Niña events, storm surge, and land subsidence rates; • the range of uncertainty in selected sea level rise projections; • a synthesis of existing information on projected sea level rise impacts to state infrastructure (such as roads, public facilities and beaches), natural areas, and coastal and marine ecosystems; and • discussion of future research needs regarding sea level rise for California.

Table 12: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
Local	
Local and Regional GHG Programs	Local air districts may directly regulate and specify GHG controls for certain large stationary sources of air pollution through the federal CAA requirements and the PSD program, the New Source Review program, or performance standards. Additionally, some local air districts have established climate action policies including guidelines to lead agencies addressing GHG in the CEQA process. Further, local governments also maintain comprehensive general plans that guide growth and development throughout their jurisdiction, and may choose to incorporate additional GHG emission reduction strategies or a climate action plan as part of a general plan (or another community plan) with guidance from the Governor's Office of Planning and Research on establishing targets and development of these policies .

9.0 HAZARDS AND HAZARDOUS MATERIALS

Existing Conditions

California Health and Safety Code (Section 25501) defines "hazardous materials" as any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. Hazardous materials are grouped into four categories based on their characteristics: toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials) and reactive (causes explosions or generates toxic gases). A hazardous waste is any hazardous material that is finished with its intended use and is discarded. This may include items, such as spent fuels, industrial solvents and chemicals, process water, and other spent materials (i.e., some types of batteries and fuel cells). California's hazardous waste regulations provides the following means to determine whether or not a waste is hazardous: (1) a list of criteria (toxic, ignitable, corrosive and reactive) that a waste may exhibit; (2) a list of those wastes that are subject to regulation; and (3) a list of chemical names and common names that are presumed to be hazardous in California.

Regulatory Setting

Table 13 describes the applicable laws and regulations for hazards and hazardous materials associated with the Proposed Regulation.

Table 13: Applicable Laws and Regulations for Hazards and Hazardous Materials	
Regulations	**Description**
Federal	
Clean Air Act (CAA) (42 USC 9601, *et seq*.)	The CAA is the law that defines US EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The last major change in the law, the CAA Amendments of 1990, was enacted by Congress in 1990. Legislation passed since then has made several minor changes. The CAA like other laws enacted by Congress, was incorporated into the United States Code as Title 42, Chapter 85. The House of Representatives maintains a current version of the U.S. Code, which includes Clean Air Act changes enacted since 1990.
Clean Water Act (CWA) (40 CFR 112)	CWA restores and maintains the chemical, physical, and biological integrity of the nation's waters by preventing point and nonpoint pollution sources, providing assistance to publicly owned treatment works (POTW) for the improvement of wastewater treatment, and maintaining the integrity of wetlands. The 1972 amendments to the CWA provide the statutory basis for the NPDES permit program and the basic structure for regulating the discharge of pollutants from point sources to waters of the United States. Section 402 of the CWA specifically required U.S. EPA to develop and implement the NPDES program.
Safe Drinking Water Act (SDWA)	SDWA is the main federal law that ensures the quality of Americans' drinking water. Under SDWA, U.S. EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. SDWA does not regulate private wells which serve fewer than 25 individuals.
Federal Underground Injection Control Program	The Federal Underground Injection Control (UIC) Program is responsible for regulating the construction, operation, permitting, and closure of injection wells that place fluids underground for storage or disposal. EPA's regulations group injection wells into six groups or "classes." Classes I - IV and VI include wells with similar functions, construction, and operating features. Class I inject hazardous wastes, industrial non-hazardous liquids, or municipal wastewater beneath the lowermost underground sources of drinking water. Class II injection wells include those associated with oil and gas production. In 1983, the Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) received EPA primary authority, primacy, to regulate Class II wells.
Federal Hazardous Materials Regulations (FHMR) (49 CFR Parts 100-180)	The regulations establish criteria for the safe transport of hazardous materials. Compliance is mandatory for intrastate and interstate transportation.

Table 13: Applicable Laws and Regulations for Hazards and Hazardous Materials	
Regulations	**Description**
Toxic Substances Control Act (TSCA) of 1976 (15 USC 2601, *et seq*.)	TSCA provides U.S. EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. TSCA addresses the production, importation, use, and disposal of specific chemicals, including polychlorinated biphenyls (PCBs), asbestos, radon and lead-based paint.
Federal Insecticide, Fungicide, Rodenticide Act of 1976 (FIFRA)	FIFRA provides federal control of pesticide distribution, sale, and use. All pesticides used in the United States must be registered (licensed) by US EPA. Registration assures that pesticides will be properly labeled and that, if used accordingly, they will not cause unreasonable harm to the environment. Use of each registered pesticide must be consistent with use directions contained on the label or labeling.
Hazardous and Solid Waste Amendments Act (HSWA) of 1984	HSWA amends RCRA to ban certain wastes from land disposal; outlines tougher hazardous waste management standards; and increased EPA's enforcement authority. The amendment also included details for corrective action (cleanup) of all hazardous waste pollution at hazardous waste facilities as well as a complete underground storage tank program
Resource Conservation and Recovery Act (RCRA) of 1976 (42 USC 6901, *et seq*.; 40 CFR)	RCRA gives US EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled US EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. HSWA - the Federal Hazardous and Solid Waste Amendments - are the 1984 amendments to RCRA that focused on waste minimization and phasing out land disposal of hazardous waste as well as corrective action for releases. Some of the other mandates of this law include increased enforcement authority for US EPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program. Federal regulations adopted by US EPA are found in Title 40, Code of Federal Regulations (40 CFR).
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980	CERCLA, commonly known as Superfund, creates a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA also enabled the revision of the National Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The NCP also established the NPL. The Superfund Amendments and Reauthorization Act (SARA) of 1986 reauthorized CERCLA to continue cleanup activities around the country. Several site-specific amendments, definitions clarifications, and technical requirements were added to the legislation, including additional

Table 13: Applicable Laws and Regulations for Hazards and Hazardous Materials	
Regulations	**Description**
	enforcement authorities. Also, Title III of SARA authorized the Emergency Planning and Community Right-to-Know Act (EPCRA).
Superfund Amendments and Reauthorization Act of 1986 (SARA)	SARA amended CERCLA by adding the following changes and additions: stressed the importance of permanent remedies and innovative treatment technologies in cleaning up hazardous waste sites; required Superfund actions to consider the standards and requirements found in other State and Federal environmental laws and regulations; provided new enforcement authorities and settlement tools; •increased State involvement in every phase of the Superfund program; •increased the focus on human health problems posed by hazardous waste sites; encouraged greater citizen participation in making decisions on how sites should be cleaned up; and increased the size of the trust fund to $8.5 billion. SARA also required EPA to revise the Hazard Ranking System (HRS) to ensure that it accurately assessed the relative degree of risk to human health and the environment posed by uncontrolled hazardous waste sites that may be placed on the National Priorities List (NPL).
Emergency Planning and Community Right-to-Know Act (EPCRA) (42 USC 9601, *et seq*.) (40 CFR Parts 350-372)	SARA created EPCRA (40 CFR Parts 350-372) -- also known as SARA Title III -- to help communities plan for emergencies involving hazardous substances. EPCRA requires hazardous chemical emergency planning by federal, state and local governments, Indian tribes, and industry. It also requires industry to report on the storage, use and releases of hazardous chemicals to federal, state, and local governments. The objective of EPCRA is to: (1) allow state and local planning for chemical emergencies, (2) provide for notification of emergency releases of chemicals, and (3) address communities' right-to-know about toxic and hazardous chemicals. EPCRA required the establishment of state/tribe emergency response commissions (SERCs/TERCs), responsible for coordinating certain emergency response activities and for appointing local emergency planning committees (LEPCs).
Pollution Prevention Act (PPA) of 1990	The Pollution Prevention Act is focused on industry, government, and public in reducing amount of pollution through cost-effective changes in production, operation, and raw materials use. Referred to as "source reductions," which includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control that reduce hazardous substances from being released into the environment prior to recycling, treatment or disposal.
Oil Pollution Act (OPA) of 1990	OPA improved the nation's ability to prevent and respond to oil spills by establishing provisions that expand the federal government's ability, and provide the money and resources necessary, to respond to oil spills. OPA also created the national Oil Spill Liability Trust Fund, which is available to provide up to one billion dollars per spill incident. OPA also

Table 13: Applicable Laws and Regulations for Hazards and Hazardous Materials	
Regulations	**Description**
	provided new requirements for contingency planning both by government and industry. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) has been expanded in a three-tiered approach: the Federal government is required to direct all public and private response efforts for certain types of spill events; Area Committees -- composed of federal, state, and local government officials -- must develop detailed, location-specific Area Contingency Plans; and owners or operators of vessels and certain facilities that pose a serious threat to the environment must prepare their own Facility Response Plans. Finally, OPA increased penalties for regulatory noncompliance, broadened response and enforcement authorities of the Federal government, and preserved State authority to establish law governing oil spill prevention and response.
Fuels and Fuel Additive Program (40 CFR 79)	EPA regulates diesel fuels under two programs; one is administered under the Office of Pollution Prevention and Toxic Substances (OPPTS) and the other is administered under the Transportation and Air Quality group. The OPPTS requires that all chemicals produced in the U.S. are registered with the Toxic Substances Control Act. The Transportation and Air Quality group requires that any fuels sold for ground transportation purposes must be registered with EPA and the volumes reported on a quarterly basis.
Pipeline Safety, Regulatory Certainty, and Job Creation Act (2011)	Pipeline Safety, Regulatory Certainty, and Job Creation Act (2011) provides for enhanced safety, reliability and environmental protection in the transportation of energy products by pipeline. Regulations promulgated under the Act will be administered by the Pipeline and Hazardous Materials Safety Administration (PHMSA) in the U.S. Department of Transportation.
State	
Various California Air Pollution Control Laws (i.e., Bluebook)	Includes all relevant Health and Safety Code sections of law, plus those air pollution- related statutes from other California codes, and the CCR Titles 13 & 17 sections that pertain to ARB's air management program.
Hazardous Materials Transportation (California Vehicle Code Sections 31301-31309)	Regulations pertaining to the safe transport of hazardous materials are in California Vehicle Code Sections 31301-31309. All motor carriers and drivers involved in transportation of hazardous materials must comply with the requirements contained in federal and state regulations, and must apply for and obtain a hazardous materials transportation license from the California Highway Patrol. A driver is required to obtain hazardous materials endorsement issued by the driver's country or state of domicile to operate any commercial vehicle carrying hazardous materials. The driver is required to display placards or markings while hauling hazardous waste, unless the driver is exempt from the endorsement requirements. A driver who is a California resident is required to obtain an endorsement from California Highway Patrol.

Table 13: Applicable Laws and Regulations for Hazards and Hazardous Materials	
Regulations	**Description**
Hazardous Waste Control Law (California Health & Safety Code, Division 20, Chapter 6.5; 22 CCR)	California requirements and statutory responsibilities in managing hazardous waste in California – this includes the generation, transportation, storage, treatment, recycling, and disposal of hazardous waste. The statute and regulation are implemented by Cal/EPA Department of Toxic Substances Control.
California Accidental Release Prevention (CalARP) Program (19 CCR 2735-2785)	The purpose of the CalARP program is to prevent accidental releases of substances that can cause serious harm to the public and the environment, to minimize the damage if releases do occur, and to satisfy community right-to-know laws. This is accomplished by requiring businesses that handle more than a threshold quantity of a regulated substance listed in the regulations to develop a Risk Management Plan (RMP). An RMP is a detailed engineering analysis of the potential accident factors present at a business and the mitigation measures that can be implemented to reduce this accident potential.
Hazardous Material Business Plan & Area Plan Program (Health and Safety Code Sections 25500 – 25520; 19 CCR, Division 2, Chapter 4, Article 3 & 4)	The business and area plans program, relating to the handling and release or threatened release of hazardous materials, was established in California to protect the public health and safety and the environment. Basic information on the location, type, quantity, and the health risks of hazardous materials handled, used, stored, or disposed of in the State, which could be accidently released into the environment, is not now available to firefighters, health officials, planners, public safety officers, health care providers, regulatory agencies, and other interested persons. The information provided by business and area plans is necessary in order to prevent or mitigate the damage to the health and safety of persons and the environment from the release or threatened release of hazardous materials into the workplace and environment. Certified Unified Program Agencies (CUPAs) use information collected from the Business Plan and CalARP programs to identify hazardous materials in their communities. This information provides the basis for the Area Plan and is used to determine the appropriate level of emergency planning necessary to respond to a release.

Table 13: Applicable Laws and Regulations for Hazards and Hazardous Materials	
Regulations	**Description**
California Unified Program Administration (CUPA) (Health and Safety Code, Chapter 6.11, Sections 25404-25404.8; 27 CCR 15100-15620)	A CUPA, which is authorized by the Secretary of Cal/EPA to carry out several of the hazardous waste/hazardous materials regulatory programs administered by the State in a coordinated and consistent manner. The 6 hazardous waste and materials program elements covered by the CUPA include: 1) Hazardous Waste Generators 2) Underground Tanks 3) Above Ground Tanks 4) Accidental Release Program 5) Hazardous Material Release Response Plans & Spill Notification 6) Hazardous Materials Management Plans & Inventory Reporting The intent of the CUPA is to simplify the hazardous materials regulatory environment and provide a single point of contact for businesses to address inspection, permitting, billing, and enforcement issues.
California Oil Spill Prevention and Response Law (OSPRA) (California Government Code §8670.1, *et seq*., California Public Resources Code §8750, *et seq*.)	The Act gives the Office of Oil Spill Prevention and Response (OSPR) Administrator substantial authority to direct all oil spill prevention, response and clean-up activities, natural resource damage assessment (NRDA) and restoration, as well as the authority to conduct studies and incorporate the findings into spill prevention and response programs throughout California. Facilities & vessels subject to the Act must prepare contingency plans, preventive and mitigation measures, cleanup plans, training, equipment testing and maintenance, and other elements, and provide financial assurance for cleanup costs.
California Coastal Act of 1976 (Public Resources Code (PRC) Division 20, §§30000, *et seq*.)	Coastal Act protects, maintains, and where feasible, enhances and restores the overall quality of the coastal zone environment and its natural and artificial resources. It also provides protection against the spillage of crude oil, gas, petroleum products, or hazardous substances in relation to any development or transportation of such materials. Oil spill prevention and response policy includes requirements to ensure proposed oil and gas projects in the coastal zone provide the highest level of protection against oil spills, and that effective containment and clean-up facilities are required. Development activities in the coastal zone, as defined by Coastal Act §30106, require a coastal development permit.
Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)	Safe Drinking Water and Toxic Enforcement Act (Prop 65) requires the State to publish a list of chemicals known to cause cancer or birth defects or other reproductive harm. Prop 65 requires businesses to provide a “clear and reasonable” warning before knowingly and intentionally exposing anyone to a listed chemical and also prohibits companies that do business within California from knowingly discharging listed chemicals into sources of drinking water.

Table 13: Applicable Laws and Regulations for Hazards and Hazardous Materials	
Regulations	**Description**
Department of Conservation, Division of Oil, Gas, and Geothermal Resources Underground Injection Control (UIC) Program	Class II injection wells - wells associated with oil and gas production - fall under DOGGR's UIC program, which is monitored and audited by the U.S. EPA. These wells are regulated under provisions of the California Public Resources Code and the federal SDWA. The main features of the UIC program include permitting, inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, and public outreach. The State Water Board and DOGGR work together to provide a single permit for the construction and operation of injection wells. Surface disposal is overseen by the Regional Water Boards and disposal of oil field produced water into deep injection wells is overseen by DOGGR.
Local	
Local ordinances and codes	Various local ordinances and codes may be adopted at the local level to provide stricter requirements in the management of hazardous materials and waste activities within the jurisdiction.

10.0 HYDROLOGY AND WATER QUALITY

Existing Conditions

Surface Waters

Surface waters occur as streams, lakes, ponds, coastal waters, lagoons, estuaries, floodplains, dry lakes, desert washes, wetlands and other collection sites. Water bodies modified or developed by man, including reservoirs and aqueducts, are also considered surface waters. Surface water resources are very diverse throughout the state, due to the high variance in tectonics, topography, geology/soils, climate, precipitation, and hydrologic conditions. Overall, California has the most diverse range of watershed conditions in the U.S., with varied climatic regimes ranging from Mediterranean climates with temperate rainforests in the north coast region to desert climates containing dry desert washes and dry lakes in the southern central region.

The State has more than sixty major stream drainages and more than 1,000 smaller, but significant drainages that drain coastal mountains and inland mountainous areas. High snowpack levels and resultant spring snowmelt yield high surface runoff and peak discharge in the Sierra Nevada and Cascade Mountains that feed surface flows, fill reservoirs and recharge groundwater. Federal, state and local engineered water projects, aqueducts, canals, and reservoirs serve as the primary conduits of surface water sources to areas that have limited surface water resources. Most of the surface water storage is transported for agricultural, urban, and rural residential needs to the San Francisco Bay Area and to cities and areas extending to southern coastal California. Surface water is also transported to southern inland areas, including Owens Valley, Imperial Valley, and Central Valley areas.

Groundwater

The majority of runoff from snowmelt and rainfall flows down mountain streams into low gradient valleys and either percolates into the ground or is discharged to the sea. This percolating flow is stored in alluvial groundwater basins that cover approximately 40 percent of the geographic extent of the State (DWR 2003). Groundwater recharge occurs more readily in areas underlain by coarse sediments, primarily in mountain base alluvial fan settings. As a result, the majority of California's groundwater basins are located in broad alluvial valleys flanking mountain ranges, such as the Cascade Range, Coast Ranges, Transverse Ranges, and the Sierra Nevada.

There are 250 major groundwater basins that serve approximately 30 percent of California's urban, agricultural and industrial water needs, especially in southern portion of San Francisco Bay, the Central Valley, greater Los Angeles area, and inland desert areas where surface water is limited. On average, more than 15 million acre-feet of groundwater are extracted each year in the State, of which more than 50 percent is extracted from 36 groundwater basins in the Central Valley.

Water Quality

Land uses have a great effect on surface water and groundwater water quality in the State of California. Water quality degradation of surface waters occurs through nonpoint- and point- source discharges of pollutants. Nonpoint source pollution is defined as not having a discrete or discernible source and is generated from land runoff, precipitation, atmospheric deposition, seepage, and hydrologic modification. Nonpoint-source pollution includes runoff containing pesticides, insecticides, and herbicides from agricultural areas and residential areas; acid drainage from inactive mines; bacteria and nutrients from septic systems and livestock; VOCs and toxic chemicals from urban runoff and industrial discharges; sediment from timber harvesting, poor road construction, improperly managed construction sites, and agricultural areas; and atmospheric deposition and hydromodification. In comparison, point-source pollution is generated from identifiable, confined, and discrete sources, such as a smokestack, sewer, pipe or culvert, or ditch. These pollutant sources are regulated by the US EPA and SWRCB through RWQCB. Many of the pollutants discharged from point-sources are the same as for nonpoint-sources, including municipal (bacteria and nutrients), agricultural (pesticides, herbicides, and insecticides), and industrial pollutants (VOCs and other toxic effluent).

Regulatory Setting

Table 14 describes the applicable laws and regulations for hydrology, water quality, and water supply associated with the Proposed Regulation.

Table 14: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply	
Regulation	**Description**
Federal	
National Flood Insurance Program (FEMA)	Designated floodplain mapping program, flooding and flood hazard reduction implementation, and federal subsidized flood insurance for residential and commercial property. Administered by the FEMA.
Executive Order 11988	Requires actions to be taken for federal activities to reduce the risks of flood losses, restore and preserve floodplains, and minimize flooding impacts to human health and safety.
CWA	Administered primarily by the U.S. Environmental Protection Agency (US EPA). Pertains to water quality standards, state responsibilities, and discharges of waste to waters of the United States. Sections 303, 401, 402, and 404.
CWA Section 303	Defines water quality standards consisting of: 1) designated beneficial uses of a water, 2) the water quality criteria (or “objectives” in California) necessary to support the uses, and 3) an antidegradation policy that protects existing uses and high water quality. Section 303(d) requires states to identify water quality impairments where conventional control methods will not achieve compliance with the standards, and establish Total Maximum Daily Load (TMDL) programs to achieve compliance.
CWA Section 401	State certification system for federal actions which may impose conditions on a project to ensure compliance with water quality standards.
CWA Section 402	Section 402 mandates permits for municipal stormwater discharges, which are regulated under the NPDES General Permit for Municipal Separate Storm Sewer Systems (MS4) (MS4 Permit). Several of the cities and counties issue their own NPDES municipal stormwater permits for the regulations of stormwater discharges. These permits require that controls are implemented to reduce the discharge of pollutants in stormwater discharges to the maximum extent possible, including management practices, control techniques, system design and engineering methods, and other measures as appropriate. As part of permit compliance, these permit holders have created Stormwater Management Plans for their respective locations. These plans outline the requirements for municipal operations, industrial and commercial businesses, construction sites, and planning and land development. These requirements may include multiple measures to control pollutants in stormwater discharge. During implementation of specific projects, applicants will be required to follow the guidance contained in the Stormwater Management Plans as defined by the permit holder in that location.
CWA Section 404	Permit system for dredging or filling activity in waters of the U.S., including wetlands, and administered by the U.S. Army Corps of

Table 14: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply	
Regulation	**Description**
	Engineers.
National Toxics Rule and California Toxics Rule	Applicable receiving water quality criteria promulgated by US EPA for priority toxic pollutants consisting generally of trace metals, synthetic organic compounds, and pesticides.
The Safe Drinking Water Act's (SDWA) Federal Underground Injection Control Program	The Federal Underground Injection Control (UIC) Program is responsible for regulating the construction, operation, permitting, and closure of injection wells that place fluids underground for storage or disposal for the purpose of protecting underground sources of drinking water. EPA's regulations group injection wells into six groups or "classes." Classes I - IV and VI include wells with similar functions, construction, and operating features. Class II injection wells include those associated with oil and gas production and fall into three general categories: enhanced oil recovery, disposal, and hydrocarbon storage. In 1983, the Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) received EPA primary authority, primacy, to regulate Class II wells.
State	
California Water Rights	The State Water Resources Control Board (SWRCB) administers review, assessment, and approval of appropriative (or priority) surface water rights permits/licenses for diversion and storage for beneficial use. Riparian water rights apply to the land and allow diversion of natural flows for beneficial uses without a permit, but users must share the resources equitably during drought. Groundwater management planning is a function of local government. Groundwater use by overlying property owners is not formally regulated, except in cases where the groundwater basin supplies are limited and uses have been adjudicated, or through appropriative procedures for groundwater transfers.
Public Trust Doctrine	Body of common law that requires the State to consider additional terms and conditions when issuing or reconsidering appropriative water rights to balance the use of the water for many beneficial uses irrespective of the water rights that have been established. Public trust resources have traditionally included navigation, commerce, and fishing and have expanded over the years to include protection of fish and wildlife, and preservation goals for scientific study, scenic qualities, and open-space uses.
Porter-Cologne Water Quality Control Act and California Water Code (Title 23)	The SWRCB is responsible for statewide water quality policy development and exercises the powers delegated to the State by the federal government under the CWA. Nine RWQCBs adopt and implement water quality control plans (Basin Plans) which designate beneficial uses of surface waters and groundwater aquifers, and

Table 14: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply	
Regulation	**Description**
	establish numeric and narrative water quality objectives for beneficial use protection. Regional Water Boards issue waste discharge requirements for discharge activities to water and land, require monitoring and maintain reporting programs, and implement enforcement and compliance policies and procedures. Other state agencies with jurisdiction in water quality regulation in California include the Department of Public Health (drinking water regulations), Department of Pesticide Regulation, Department of Toxic Substances Control, CDFW, and the Office of Environmental Health and Hazard Assessment.
Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California	Commonly referred to as the State Implementation Policy (or SIP), the SIP provides implementation procedures for discharges of toxic pollutants to receiving waters.
Thermal Plan	The Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California was adopted by the SWRCB in 1972 and amended in 1975. The Thermal Plan restricts discharges of thermal waste or elevated temperature waste to waters of the state. Generally, the Thermal Plan prohibits discharges from increasing ambient temperatures by more than 1ºF over more than 25 percent of a stream cross section, increasing ambient temperatures by more than 4ºF in any location, and prohibits discharge of waste that exceeds more than 20ºF above the ambient temperature.
Statewide NPDES General Permit for Stormwater Associated with Land Disturbance and Construction Activity (Order No. 2009-0009-DWQ, NPDES No. CAR000002)	NPDES permit for stormwater and non-storm discharges from construction activity that disturbs greater than one acre. The general construction permit requires the preparation of a SWPPP that identifies BMPs to be implemented to control pollution of storm water runoff. The permit specifies minimum construction BMPs based on a risk-level determination of the potential of the project site to contribute to erosion and sediment transport and sensitivity of receiving waters to sediment. While small amounts of construction-related dewatering are covered under the General Construction Permit, the RWQCB has also adopted a General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Dewatering Permit). This permit applies to various categories of dewatering activities and may apply to some construction sites, if construction of specific projects required

Table 14: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply	
Regulation	**Description**
	dewatering in greater quantities than that allowed by the General Construction Permit and discharged the effluent to surface waters. The General Dewatering Permit contains waste discharge limitations and prohibitions similar to those in the General Construction Permit.
Statewide NPDES General Permit for Discharges of Stormwater Associated with Industrial Facilities (Order No. 97-003-DWQ, NPDES No. CAS000001)	NPDES permit for stormwater and non-storm discharges from types of industrial sites based on the Standard Industrial Classification. The general industrial permit requires the preparation of a SWPPP that identifies potential onsite pollutants, BMPs to be implemented, and inspection/monitoring.
Department of Conservation, Division of Oil, Gas, and Geothermal Resources Underground Injection Control (UIC) Program	Class II injection wells - wells associated with oil and gas production - fall under DOGGR's UIC program, which is monitored and audited by the U.S. EPA. These wells are regulated under provisions of the California Public Resources Code and the federal SDWA. The main features of the UIC program include permitting, inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, and public outreach. The State Water Board and DOGGR work together to provide a single permit for the construction and operation of injection wells. Surface disposal is overseen by the Regional Water Boards and disposal of oil field produced water into deep injection wells is overseen by DOGGR.
Senate Bill 1168	This bill requires all groundwater basins designated as high- or medium-priority basins by DWR that are designated as basins subject to critical conditions of overdraft to be managed under a groundwater sustainability plan or coordinated groundwater sustainability plans by January 31, 2020, and requires all other groundwater basins designated as high- or medium-priority basins to be managed under a groundwater sustainability plan or coordinated groundwater sustainability plans by January 31, 2022. This bill would require a groundwater sustainability plan to be developed and implemented to meet the sustainability goal, established as prescribed, and would require the plan to include prescribed components.
Assembly Bill 1739	This bill establishes groundwater reporting requirements for a person extracting groundwater in an area within a basin that is not within the management area of a groundwater sustainability agency or a probationary basin. The bill requires the reports to be submitted to the SWRCB or, in certain areas, to an entity designated as a local agency by the SWRCB.

Table 14: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply	
Regulation	**Description**
Senate Bill 1319	This bill allows the SWRCB to designate a groundwater basin as a probationary basin subject to sustainable groundwater management requirements. This bill also authorizes SWRCB to develop an interim management plan in consultation with the DWR under specified conditions.
Local	
Water Agencies	Water agencies enter into contracts or agreements with the federal and state governments to protect the water supply and to ensure the lands within the agency have a dependable supply of suitable quality water to meet present and future needs.
Floodplain Management	General Plans guide County land use decisions, and require the identification of water resource protection goals, objectives, and policies. Floodplain management is addressed through ordinances, land use planning, and development design review and approval. Local actions may be coordinated with FEMA for the National Flood Insurance Program. Typical provisions address floodplain use restrictions, flood protection requirement, allowable alteration of floodplains and stream channels, control of fill and grading activities in floodplains, and prevention of flood diversions where flows would increase flood hazards in other areas.
Drainage, Grading, and Erosion Control Ordinances	Counties regulate building activity under the federal Uniform Building Code, local ordinances, and related development design review, approval, and permitting. Local ordinances are common for water quality protection addressing drainage, stormwater management, land grading, and erosion and sedimentation control.
Environmental Health	The RWQCBs generally delegate permit authority to County health departments to regulate the construction and operation/maintenance of on-site sewage disposal systems (e.g., septic systems and leach fields, cesspools).

11.0 LAND USE AND PLANNING

Existing Conditions

In California, the State Planning and Zoning Law (California Government Code section 65000 et seq.) provides the primary legal framework that cities and counties must follow in land use planning and controls. Planned land uses are designated in the city or county General Plan, which serves as the comprehensive master plan for the community. Also, city and county land use and other related resource policies are defined in the General Plan. The primary land use regulatory tool provided by the California Planning and Zoning Law is the zoning ordinance adopted by each city and

county. Planning and Zoning Law requirements are discussed in the regulatory setting below.

When approving land use development, cities and counties must comply with CEQA, which requires that they consider the significant environmental impacts of their actions and the adoption of all feasible mitigation measures to substantially reduce significant impacts, in the event a project causes significant or potentially significant effects on the environment. In some cases, building permits may be ministerial, and therefore exempt from CEQA, but most land use development approval actions by cities and counties require CEQA compliance.

Regulatory Setting

Table 15 describes the applicable laws and regulations for land use and planning associated with the Proposed Regulation.

Table 15: Applicable Laws and Regulations for Land Use and Planning

Regulation	Description
Federal	
FLPMA	FLPMA is the principal law governing how the BLM manages public lands. FLPMA requires the BLM to manage public land resources for multiple use and sustained yield for both present and future generations. Under FLPMA, the BLM is authorized to grant right-of-ways for generation, transmission, and distribution of electrical energy. Although local agencies do not have jurisdiction over the federal lands managed by the BLM, under FLPMA and the BLM regulations at 43 CFR Part 1600, the BLM must coordinate its planning efforts with state and local planning initiatives. FLPMA defines an Area of Critical Environmental Concern (ACEC) as an area within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. The BLM identifies, evaluates, and designates ACECs through its resource management planning process. Allowable management practices and uses, mitigation, and use limitations, if any, are described in the planning document and the concurrent or subsequent ACEC Management Plan. ACECs are considered land use authorization avoidance areas because they are known to contain resource values that could result in denial of applications for land uses that cannot be designed to be compatible with management objectives and prescriptions for the ACEC.
BLM Resource Management Plans	Established by FLPMA, Resource Management Plans are designed to protect present and future land uses and to identify management practices needed to achieve desired conditions within the management area covered

Table 15: Applicable Laws and Regulations for Land Use and Planning	
Regulation	**Description**
	by the Resource Management Plans. Management direction is set forth in the Resource Management Plans in the form of goals, objectives, standards, and guidelines. These, in turn, direct management actions, activities, and uses that affect land management, and water, recreation, visual, natural, and cultural resources.
National Forest Management Act (NFMA)	NFMA is the primary statute governing the administration of national forests. The act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. Goal 4 of the USFS's National Strategic Plan for the National Forests states that the nation's forests and grasslands play a significant role in meeting America's need for producing and transmitting energy. Unless otherwise restricted, National Forest Service lands are available for energy exploration, development, and infrastructure (e.g., well sites, pipelines, and transmission lines). However, the emphasis on non-recreational special uses, such as utility corridors, is to authorize the special uses only when they cannot be reasonably accommodated on non-National Forest Service lands.
State	
State Planning and Zoning Law	California Government Code section 65300 et seq. establishes the obligation of cities and counties to adopt and implement general plans. The general plan is a comprehensive, long-term, and general document that describes plans for the physical development of the city or county. The general plan addresses a broad range of topics, including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the general plan identifies the goals, objectives, policies, principles, standards, and plan proposals that support the city or county's vision for the area. The general plan is also a long-range document that typically addresses the physical character of an area over a 20-year period. Although the general plan serves as a blueprint for future development and identifies the overall vision for the planning area, it remains general enough to allow for flexibility in the approach taken to achieve the plan's goals.
Subdivision Map Act (Government Code section 66410 et seq.)	In general, land cannot be divided in California without local government approval. The primary goals of the Subdivision Map Act are: (a) to encourage orderly community development by providing for the regulation and control of the design and improvements of the subdivision with a proper consideration of its relation to adjoining areas; (b) to ensure that the areas within the subdivision that are dedicated for public purposes will be properly improved by the subdivider so that they will not become an undue burden on the community; and (c) to protect the public and individual transferees from fraud and exploitation. (61 Ops. Cal.Atty. Gen. 299, 301 [1978]; 77 Ops. Cal.Atty. Gen. 185 [1994]). Dividing land for sale, lease or financing is

Table 15: Applicable Laws and Regulations for Land Use and Planning	
Regulation	**Description**
	regulated by local ordinances based on the state Subdivision Map Act (Government Code section 66410 et seq.).
Local	
General Plans	The most comprehensive land use planning is provided by city and county general plans, which local governments are required by State law to prepare as a guide for future development. The general plan contains goals and policies concerning topics that are mandated by State law or which the jurisdiction has chosen to include. Required topics are: land use, circulation, housing, conservation, open space, noise, and safety. Other topics that local governments frequently choose to address are public facilities, parks and recreation, community design, or growth management, among others. City and county general plans must be consistent with each other. County general plans must cover areas not included by city general plans (i.e., unincorporated areas).
Specific and Community Plans	A city or county may also provide land use planning by developing community or specific plans for smaller, more specific areas within their jurisdiction. These more localized plans provide for focused guidance for developing a specific area, with development standards tailored to the area, as well as systematic implementation of the general plan. Specific and community plans are required to be consistent with the city or county's general plan.
Zoning	The city or county zoning code is the set of detailed requirements that implement the general plan policies at the level of the individual parcel. The zoning code presents standards for different uses and identifies which uses are allowed in the various zoning districts of the jurisdiction. Since 1971, State law has required the city or county zoning code to be consistent with the jurisdiction's general plan, except in charter cities.
Housing Element Law	State law requires each city and county to adopt a general plan containing at least seven mandatory elements including housing. Unlike the other general plan elements, the housing element, required to be updated every five to six years, is subject to detailed statutory requirements and mandatory review by a State agency, the California Department of Housing and Community Development (Department). Housing elements have been mandatory portions of local general plans since 1969. This reflects the statutory recognition that housing is a matter of statewide importance and cooperation between government and the private sector is critical to attainment of the State's housing goals. The availability of an adequate supply of housing affordable to workers, families, and seniors is critical to the State's long-term economic competitiveness and the quality of life for all Californians.

12.0 MINERAL RESOURCES

Existing Conditions

The CGS classifies the regional significance of mineral resources in accordance with the California Surface Mining and Reclamation Act of 1975 and assists the CGS in the designation of land containing significant aggregate resources. Mineral Resources Zones (MRZs) have been designated to indicate the significance of mineral deposits. The MRZ categories follow:

MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence.

MRZ-2: Areas where adequate information indicates significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence.

MRZ-3: Areas containing mineral deposits the significance of which cannot be evaluated from available data.

MRZ-4: Areas where available information is inadequate for assignment to any other MRZ.

California ranks as the 7th state in the U.S. for non-fuel mineral production, accounting for approximately 3.9 percent of the nation's total. In 2011, there were approximately 700 active mineral mines that produced: sand and gravel, boron, Portland cement, crushed stone, gold, masonry cement, clays, gemstones, gypsum, salt, silver, and other minerals (Clinkenbeard and Smith 2013).

Regulatory Setting

Table 16 describes the applicable laws and regulations for mineral resources associated with the Proposed Regulation.

Table 16: Applicable Laws and Regulations for Mineral Resources

Regulation	Description
Federal	
Mining and Mineral Policy Act	The Mining and Mineral Act of 1970 declared that the Federal Government policy is to encourage private enterprise in the development of a sound and stable domestic mineral industry, domestic mineral deposits, minerals research, and methods for reclamation in the minerals industry.
State	
Surface Mining and	The intent of SMARA of 1975 is to promote production and conservation

Table 16: Applicable Laws and Regulations for Mineral Resources	
Regulation	**Description**
Reclamation Act (SMARA)	of mineral resources, minimize environmental effects of mining, and to assure that mined lands will be reclaimed to conditions suitable for alternative uses. An important part of the SMARA legislation requires the State Geologist to classify land according to the presence or absence of significant mineral deposits. Local jurisdictions are given the authority to permit or restrict mining operations, adhering to the SMARA legislation. Classification of an area using Mineral Resource Zones (MRZ) to designate lands that contain mineral deposits are designed to protect mineral deposits from encroaching urbanization and land uses that are incompatible with mining. The MRZ classifications reflect varying degrees of mineral significance, determined by available knowledge of the presence or absence of mineral deposits as well as the economic potential of the deposits.
CBSC (CCR Title 24)	California's minimum standards for structural design and construction are given in the CBSC (CCR Title 24). The CBSC is based on the Uniform Building Code (International Code Council 1997), which is used widely throughout United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed or more stringent regulations. The CBSC provides standards for various aspects of construction, including (i.e., not limited to) excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, proponents of specific projects would be required to comply with all provisions of the CBSC for certain aspects of design and construction.
Local	
Local Grading and Erosion Control Ordinances	Many counties and cities have grading and erosion control ordinances. These ordinances are intended to control erosion and sedimentation caused by construction activities. A grading permit is typically required for construction-related projects. As part of the permit, project applicants usually must submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit include a description of BMPs similar to those contained in a SWPPP.
County General Plans (and EIR)	Some county General Plans provide a regulatory framework to address potential environmental impacts that may result from a proposed project

13.0 NOISE

Existing Conditions

Acoustics is the scientific study that evaluates perception, propagation, absorption, and reflection of sound waves. Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable, unexpected, or unwanted is generally defined as noise. Common sources of environmental noise and noise levels are presented in Table 17.

Table 17: Typical Noise Levels

Common Outdoor Activities	Noise Level (dB)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet	100	--
Gas lawnmower at 3 feet	90	--
Diesel truck moving at 50 mph at 50 feet	80	Food blender at 3 feet, Garbage disposal at 3 feet
Noisy urban area, Gas lawnmower at 100 feet	70	Vacuum cleaner at 10 feet, Normal speech at 3 feet
Commercial area, Heavy traffic at 300 feet	60	
Quiet urban daytime	50	Large business office, Dishwasher in next room
Quiet urban nighttime	40	Theater, Large conference room (background)
Quiet suburban nighttime	30	Library, Bedroom at night, Concert hall (background)
Quiet rural nighttime	20	Broadcast/Recording Studio
	10	--
Threshold of Human Hearing	0	Threshold of Human Hearing

Notes: dB=A-weighted decibels; mph=miles per hour
Source: Caltrans 2009: p.2-21

Sound Properties

A sound wave is initiated in a medium by a vibrating object (e.g., vocal chords, the string of a guitar, the diaphragm of a radio speaker). The wave consists of minute variations in pressure, oscillating above and below the ambient atmospheric pressure. The number of pressure variation cycles occurring per second is referred to as the frequency of the sound wave and is expressed in hertz.

Directly measuring sound pressure fluctuations would require the use of a very large and cumbersome range of numbers. To avoid this and have a more useable numbering

system, the decibel (dB) scale was introduced. A sound level expressed in decibels is the logarithmic ratio of two like pressure quantities, with one pressure quantity being a reference sound pressure. For sound pressure in air the standard reference quantity is generally considered to be 20 micropascals, which directly corresponds to the threshold of human hearing. The use of the decibel is a convenient way to handle the million-fold range of sound pressures to which the human ear is sensitive. A decibel is logarithmic; it does not follow normal algebraic methods and cannot be directly summed. For example, a 65 dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). A sound level increase of 10 dB corresponds to 10 times the acoustical energy, and an increase of 20 dB equates to a 100 fold increase in acoustical energy.

The loudness of sound perceived by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. There is a strong correlation between the way humans perceive sound and A-weighted sound levels (dBA). For this reason the dBA can be used to predict community response to noise from the environment, including noise from transportation and stationary sources. Sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise.

Noise can be generated by a number of sources, including mobile sources (i.e., transportation) such as automobiles, trucks, and airplanes and stationary sources (i.e., non-transportation) such as construction sites, machinery, and commercial and industrial operations. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (i.e., decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers. Noise generated from mobile sources generally attenuate at a rate of 4.5 dB per doubling of distance. Stationary noise sources spread with more spherical dispersion patterns that attenuate at a rate of 6 to 7.5 dB per doubling of distance.

Atmospheric conditions such as wind speed, turbulence, temperature gradients, and humidity may additionally alter the propagation of noise and affect levels at a receiver. Furthermore, the presence of a large object (e.g., barrier, topographic features, and intervening building façades) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of noise level reduction (i.e., shielding) provided by a barrier primarily depends on the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural (e.g., berms, hills, and dense vegetation) and human-made features (e.g., buildings and walls) may be used as noise barriers.

All buildings provide some exterior-to-interior noise reduction. A building constructed with a wood frame and a stucco or wood sheathing exterior typically provides a minimum exterior-to-interior noise reduction of 25 dB with its windows closed, whereas a building constructed of a steel or concrete frame, a curtain wall or masonry exterior wall, and fixed plate glass windows of one-quarter-inch thickness typically provides an exterior-to-interior noise reduction of 30–40 dB with its windows closed (Paul S. Veneklasen & Associates 1973, cited in Caltrans 2002: p. 7-37).

Common Noise Descriptors

The intensity of environmental noise fluctuates over time, and several different descriptors of time-averaged noise levels are used. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors most often in relation to the environment are defined below (Caltrans 2009).

Equivalent Noise Level (L_{eq}): The equivalent steady-state noise level in a stated period of time that would contain the same acoustic energy as the time-varying noise level during the same period (i.e., average noise level).

Maximum Noise Level (L_{max}): The highest instantaneous noise level during a specified time period.

Minimum Noise Level (L_{min}): The lowest instantaneous noise level during a specified time period.

Day-Night Noise Level (L_{dn}): The 24-hour L_{eq} with a 10-dB penalty applied during the noise-sensitive hours from 10 p.m. to 7 a.m., which are typically reserved for sleeping.

Community Noise Equivalent Level (CNEL): Similar to the L_{dn} described above with an additional 5-dB penalty applied during the noise-sensitive hours from 7 p.m. to 10 p.m., which are typically reserved for relaxation, conversation, reading, and watching television.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the L_{eq} descriptor listed above, which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and shows very good correlation with community response to noise.

Effects of Noise on Humans

Excessive and chronic exposure to elevated noise levels can result in auditory and non-auditory effects on humans. Auditory effects of noise on people are those related to temporary or permanent hearing loss caused by loud noises. Non-auditory effects of

exposure to elevated noise levels are those related to behavioral and physiological effects. The non-auditory behavioral effects of noise on humans are associated primarily with the subjective effects of annoyance, nuisance, and dissatisfaction, which lead to interference with activities such as communications, sleep, and learning. The non-auditory physiological health effects of noise on humans have been the subject of considerable research attempting to discover correlations between exposure to elevated noise levels and health problems, such as hypertension and cardiovascular disease. The mass of research infers that noise-related health issues are predominantly the result of behavioral stressors and not a direct noise-induced response. The extent to which noise contributes to non-auditory health effects remains a subject of considerable research, with no definitive conclusions.

The degree to which noise results in annoyance and interference is highly subjective and may be influenced by several non-acoustic factors. The number and effect of these non-acoustic environmental and physical factors vary depending on individual characteristics of the noise environment such as sensitivity, level of activity, location, time of day, and length of exposure. One key aspect in the prediction of human response to new noise environments is the individual level of adaptation to an existing noise environment. The greater the change in the noise levels that are attributed to a new noise source, relative to the environment an individual has become accustom to, the less tolerable the new noise source will be perceived.

With respect to how humans perceive and react to changes in noise levels, a 1 dB increase is imperceptible, a 3 dB increase is barely perceptible, a 6 dB increase is clearly noticeable, and a 10 dB increase is subjectively perceived as approximately twice as loud (Egan 2007: p. 21). These subjective reactions to changes in noise levels was developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dB, as this is the usual range of voice and interior noise levels. For these reasons, a noise level increase of 3 dB or more is typically considered substantial in terms of the degradation of the existing noise environment.

Negative effects of noise exposure include physical damage to the human auditory system, interference, and disease. Exposure to noise may result in physical damage to the auditory system, which may lead to gradual or traumatic hearing loss. Gradual hearing loss is caused by sustained exposure to moderately high noise levels over a period of time; traumatic hearing loss is caused by sudden exposure to extremely high noise levels over a short period. Gradual and traumatic hearing loss both may result in permanent hearing damage. In addition, noise may interfere with or interrupt sleep, relaxation, recreation, and communication. Although most interference may be classified as annoying, the inability to hear a warning signal may be considered dangerous. Noise may also be a contributor to diseases associated with stress, such as hypertension, anxiety, and heart disease. The degree to which noise contributes to such

diseases depends on the frequency, bandwidth, and level of the noise, and the exposure time (Caltrans 2009).

Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, (e.g., operating factory machinery or transient in nature, explosions). Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (FTA 2006, Caltrans 2004). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a 1-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2006). This is based on a reference value of 1micro (μ) inch/second.

The typical background vibration-velocity level in residential areas is approximately 50 VdB. Groundborne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA 2006).

Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Construction activities could generate groundborne vibrations that potentially pose a risk to nearby structures. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants (FTA 2006).

Construction vibrations can be transient, random, or continuous. Transient construction vibrations are generated by blasting, impact pile driving, and wrecking balls. Continuous vibrations result from vibratory pile drivers, large pumps, and compressors. Random

vibration can result from jackhammers, pavement breakers, and heavy construction equipment. Table 18 describes the general human response to different levels of groundborne vibration-velocity levels.

Table 18: Human Response to Different Levels of Groundborne Noise & Vibration	
Vibration-Velocity Level	**Human Reaction**
65 VdB	Approximate threshold of perception.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.
Notes: VdB = vibration decibels referenced to 1 μ inch/second and based on the root mean square (RMS) velocity amplitude. Source: FTA 2006: p. 7-8	

Sensitive Land Uses

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, schools, historic sites, cemeteries, and recreation areas are also generally considered sensitive to increases in exterior noise levels. Places of worship and transit lodging, and other places where low interior noise levels are essential are also considered noise-sensitive. These types of receptors are also considered vibration-sensitive land uses in addition to commercial and industrial buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance.

Regulatory Setting

Table 19 describes the applicable laws and regulations for noise associated with the Proposed Regulation.

Table 19: Applicable Laws and Regulations for Noise	
Regulation	**Description**
Federal	
Federal Noise Control Act (1972) US EPA, 40 CFR 201-211	This act established a requirement that all federal agencies administer their programs to promote an environment free of noise that jeopardizes public health or welfare. US EPA was given the responsibility for

Table 19: Applicable Laws and Regulations for Noise	
Regulation	**Description**
	providing information to the public regarding identifiable effects of noise on public health or welfare, publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety, coordinating federal research and activities related to noise control, and establishing federal noise emission standards for selected products distributed in interstate commerce. This act also directed that all federal agencies comply with applicable federal, state, interstate, and local noise control regulations.
Quiet Communities Act (1978)	This act promotes the development of effective State and local noise control programs, to provide funds for noise research, and to produce and disseminate educational materials to the public on the harmful effects of noise and ways to effectively control it.
24 CFR, Part 51B (U.S. Department of Housing and Urban Development [HUD])	This regulation established standards for HUD-assisted projects and actions, requirements, and guidelines on noise abatement and control.
Federal Aviation Administration (FAA) Order 1050.1D	This order contains policies and procedures for considering environmental impacts.
14 CFR, Part 150 (FAA)	These address airport noise compatibility planning and include a system for measuring airport noise impacts and present guidelines for identifying incompatible land uses. All land uses are considered compatible with noise levels of less than 65 dBA L_{dn}. At higher noise levels, selected land uses are also deemed acceptable, depending on the nature of the use and the degree of structural noise attenuation provided.
International Standards and Recommended Practices (International Civil Aviation Organization)	This contains policies and procedures for considering environmental impacts (e.g., aircraft noise emission standards and atmospheric sound attenuation factors).
32 CFR, Part 256 (Department of Defense Air Installations Compatible Use Zones [AICUZ] Program)	AICUZ plans prepared for individual airfields are primarily intended as recommendations to local communities regarding the importance of maintaining land uses which are compatible with the noise and safety impacts of military aircraft operations.
23 CFR, Part 772, Federal Highway Administration (FHWA) standards, policies, and procedures	FHWA standards, policies, and procedures provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways.
29 CFR, Part 1910,	This regulation established a standard for noise exposure in the

Table 19: Applicable Laws and Regulations for Noise	
Regulation	**Description**
Section 1910.95 (U.S. Department of Labor Occupational Safety and Health Administration [OSHA])	workplace.
FTA Guidance	This guidance presents procedures for predicting and assessing noise and vibration impacts of proposed mass transit projects. All types of bus and rail projects are covered. Procedures for assessing noise and vibration impacts are provided for different stages of project development, from early planning before mode and alignment have been selected through preliminary engineering and final design. Both for noise and vibration, there are three levels of analysis described. The framework acts as a screening process, reserving detailed analysis for projects with the greatest potential for impacts while allowing a simpler process for projects with little or no effects. This guidance contains noise and vibration impact criteria that are used to assess the magnitude of predicted impacts. A range of mitigation is described for dealing with adverse noise and vibration impacts.
49 CFR 210 (Federal Rail Administration [FRA] Railroad Noise Emission Compliance Standards) and FRA Guidance (2005)	This section and guidance provides contains criteria and procedures for use in analyzing the potential noise and vibration impacts of various types of high-speed fixed guideway transportation systems.
State	
CPUC Section 21670	The State Aeronautics Act of the CPUC establishes statewide requirements for airport land use compatibility planning and requires nearly every county to create an Airport Land Use Commission or other alternative.
Section 5000 et seq. (CCR, Title 21, Division 2.5, Chapter 6), California Airport Noise Regulations promulgated in accordance with the State Aeronautics Act	In Section 5006, the regulations state that: “The level of noise acceptable to a reasonable person residing in the vicinity of an airport is established as a CNEL value of 65 dBA for purposes of these regulations. This criterion level has been chosen for reasonable persons residing in urban residential areas where houses are of typical California construction and may have windows partially open. It has been selected with reference to speech, sleep and community reaction.
California Streets and Highways Code Section 216 (Freeway Noise in Classrooms)	This section, known as the Control of Freeway Noise in School Classrooms, requires that, in general, Caltrans abate noise from freeways to specified levels when the noise exceeds specified levels in school classrooms
California Government Code Section 65302	This section requires Caltrans to provide cities and counties with noise contour maps along State highways.

Table 19: Applicable Laws and Regulations for Noise	
Regulation	**Description**
(Provision of Noise Contour Maps)	
Title 24, Part 2, California Code of Regulations	These establish standards governing interior noise levels that apply to all new single-family and multi-family residential units in California. These standards require that acoustical studies be performed before construction at building locations where the existing L_{dn} exceeds 60 dBA. Such acoustical studies are required to establish mitigation that will limit maximum Ldn levels to 45 dBA in any habitable room.

14.0 EMPLOYMENT, POPULATION, AND HOUSING

Existing Conditions

Population

Population trends and growth projections are useful measures to help predict and plan for future State recreational facility needs. According to the California Department of Finance 2010 Census data, the population of California in 2010 was approximately 37,253,956 (US Census Bureau 2014). Since California became a state in 1850, the population has been increasing rapidly. Within the first 150 years of California's statehood, the population increased from fewer than 100,000 citizens to almost 34 million in 2000 (CSP 2008). It is expected that the population of California will reach and surpass the 50-million mark sometime between 2030 and 2040 if the current growth rates persist (CSP 2008).

Housing

As population within the State increases, housing distribution and household conditions are expected to evolve. Existing housing units, households, and vacancy rates for the State of California are shown below in Table 20. Data was derived from the California Department of Finance 2010 Census (U.S. Census Bureau 2014).

Table 20: California Housing Profile	
Total Housing Units	13,680,081
Total households	12,577,498
Vacant housing units	1,102,583
Owner-occupied	7,035,371
Renter-occupied	15,691,211
Homeowner vacancy rate	2.1
Rental vacancy rate	6.3
Source: DOF 2010	

Regulatory Setting

Federal and state laws do not control population and employment. See housing-related regulations in Section 11, Land Use and Planning.

15.0 PUBLIC SERVICES

Existing Conditions

Law Enforcement

US EPA is charged with protecting human health and the environment, by writing and enforcing regulations based on laws passed by Congress. The Environmental Protection Agency's Criminal Investigation Division primary mission is the enforcement of the United States' environmental laws as well as any other federal law in accordance with the guidelines established by the Attorney General of the United States (18 U.S.C. 3063). These environmental laws include those specifically related to air, water and land resources.

Enforcement of environmental laws in California is the responsibility of the Attorney General's Office and the CalEPA. The Attorney General represents the people of California in civil and criminal matters before trial courts, appellate courts and the supreme courts of California and the United States. In regards to environmental issues, the Attorney General enforces laws that safeguard the environment and natural resources in the State. Recent actions by the Attorney General related to air quality and climate change issues include: legally defending the State's clean cars law against multiple challenges, filing numerous actions against the Bush Administration regarding regulation of global warming pollution, working with local governments to ensure that land use planning processes take account of global warming, promoting renewable energy and enhanced energy efficiency in California, and working with other State leaders and agencies to implement AB 32, the Global Warming Solutions Act of 2006.

CalEPA was created in 1991 by Governor's Executive Order. CalEPA's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality. The CalEPA is comprised of various boards, departments and offices, including: ARB, Department of Pesticide Regulation, Department of Toxic Substances Control, Office of Environmental Health Hazard Assessment, and State Water Resources Control Board (including the nine Regional Water Quality Control Boards).

California's environmental laws are enforced by State and local agencies, each charged with enforcing the laws governing a specific media such as air, water, hazardous waste, solid waste, and pesticides. Enforcement agencies for these media are as follows:

- Air: ARB (part of CalEPA) and Local Air Districts.
- Water: SWRCB (part of CalEPA), RWQCBs (part of CalEPA), local waste water officials, and the California Department of Public Health.

- Hazardous Waste: Department of Toxic Substances Control (part of CalEPA) and CUPA.
- Carcinogens/Reproductive Toxins: Prop. 65 through the Office of Environmental Health Hazard Assessment (part of CalEPA).
- Pesticides: Department of Pesticide Regulation (part of CalEPA) and County Agricultural Commissioners

Statewide law enforcement service is provided by the California Highway Patrol, which is responsible for protecting State resources and providing crime prevention services and traffic enforcement along the State's highways and byways.

Community law enforcement service is provided by local police and sheriff agencies (i.e., cities and counties, respectively) to prevent crime, respond to emergency incidents, and provide traffic enforcement on local roadways.

Fire Protection and Emergency Medical Response Services

The United States Forest Service is an agency of the United States Department of Agriculture that administers the nation's 155 national forests and 20 national grasslands, which encompass 193 million acres (780,000 km^2), including fire protection and response services. Major divisions of the agency include the National Forest System, State and Private Forestry, and the Research and Development branch. The Fire and Aviation Management part of the US Forest Service works to advance technologies in fire management and suppression, maintain and improve the extremely efficient mobilization and tracking systems in place, and reach out in support of our Federal, State, and International fire partners.

State-level fire protection and emergency response service is provided by the California Department of Forestry and Fire Protection (CAL FIRE), primarily in rural areas of the State. CAL FIRE is an emergency response and resource protection department. CAL FIRE protects lives, property and natural resources from fire, responds to emergencies of all types, and protects and preserves timberlands, wildlands, and urban forests.

Local and urban fire protection service is provided by local fire districts and/or local agencies (e.g., fire departments of cities and counties). In addition to providing fire response services most fire agencies also provide emergency medical response services (i.e., ambulance services) within their service areas.

Schools

Education is primarily a state and local responsibility in the United States. States and communities, as well as public and private organizations, establish schools, develop curricula, and determine requirements for enrollment and graduation. Statewide, the regulation of education for youth is provided by the California Department of Education. The State Board of Education (SBE) is the governing and policy-making body of the California Department of Education. The SBE sets K-12 education policy in the areas of

standards, instructional materials, assessment, and accountability. Locally, school districts are responsible for the management and development of elementary, middle, and high-school facilities.

Regulatory Setting

Table 21 describes the applicable laws and regulations for public services associated with the Proposed Regulation.

Table 21: Applicable Laws and Regulations for Public Services

Regulation	Description
Federal	**None applicable.**
American with Disabilities Act	Guidelines to ensure that facilities are accessible to individuals with disabilities. Implements requirements for the design and construction of buildings.
State	
State Fire Responsibility Areas	Areas delineated by the CAL FIRE for which the State assumes primary financial responsibility for protecting natural resources from damages of fire. Local jurisdictions are required to adopt minimum recommended requirements for road design, road identification, emergency fire suppression and fuel breaks and greenbelts. All projects within or adjacent to a State Fire Responsibility Area must meet these requirements.
State School Funding	Education Code Section 17620 authorizes school districts to levy a fee, charge, dedication, or other requirement for any development project for the construction or reconstruction of school facilities.

16.0 RECREATION

Existing Conditions

Recreational resources and facilities are provided and managed at federal, state, and local levels. The federal government manages a diverse array of recreation facilities and resources in California that include national parks and monuments, national forests and grasslands, wildlife refuges, wilderness areas, lakes and lands managed by different agencies in the federal government, wild and scenic rivers, and back country byways, national trials, and marine reserves and estuaries. USFWS manages the wildlife and fisheries resources and their habitats. Each federal agency's programs include recreation components

California has over 275 State beaches and parks, recreation areas, wildlife areas, historic parks, and museums, and has authority over fishing and hunting activities, habitat restoration and protection in the State. General plans for State parks, recreation areas,

and beaches are publicly available. The California Outdoor Recreation Plan and associated research provide policy guidance to all public agencies – federal, state, local, and special districts that oversee outdoor recreation on lands, facilities and services throughout California Agencies and departments that have involvement in recreational activities include Boating and Waterways, Fish and Wildlife, Tahoe Regional Planning Association, various conservancies, and others (California State Parks 2008).

Recreational lands and facilities are also managed by regional and local park and recreation agencies and open space districts. City and county general plans contain recreation elements that provide framework for planning agencies to consider when projects are developed and implemented.

Regulatory Setting

Table 22 describes the applicable laws and regulations for recreation associated with the Proposed Regulation.

Table 22: Applicable Laws and Regulations for Recreation

Regulation	Description
Federal	
FLPMA, 1976 – 43 CFR 1600	Establishes public land policy; guidelines for administration; and provides for the "multiple use" management, protection, development, and enhancement of public lands. "Multiple use" management, defined as "management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people" with recreation identified as one of the resource values.
State	None applicable
Local	
General Plans	General plans for cities and counties contain designations for recreational areas. These are policy documents with planned land use maps and related information that are designed to give long-range guidance to those local officials making decisions affecting the growth and resources of their jurisdictions. Because of the number and variety of general plans and related local plans, they are not listed individually.

17.0 TRANSPORTATION AND TRAFFIC

Existing Conditions

Existing roadway systems in the project area generally consist of highways, freeways, arterials, local streets, and intersections/ramps. The existing average annual daily traffic

(AADT) volumes on the roadway segments that comprise these systems vary considerably (i.e., from hundreds to hundreds of thousands). The level of service (LOS), a scale used to determine the operating quality of a roadway segment or intersection based on volume-to-capacity ratio (V/C) or average delay, also vary from LOS A, the best and smoothest operating conditions, to LOS F, most congested operating conditions. Other roadway and traffic volume characteristics such as roadway length, number of lanes and facility type (e.g., two-lane freeway), right-of-way width and pavement width, terrain classification (e.g., flat), percent of heavy-duty truck traffic, and accident rates (e.g., number of accidents per million vehicle miles traveled) also vary substantially depending on the location. In addition to the roadway systems, circulation networks provide additional transportation opportunities and include mass transit, airports, and non-motorized travel (e.g., pedestrian and bicycle paths).

Regulatory Setting

Table 23 describes the applicable laws and regulations transportation and traffic associated with the Proposed Regulation.

Table 23: Applicable Laws and Regulations for Transportation and Traffic

Regulation	Description
Federal	
Federal Aviation Act (FAA) (40 CFR, Part 77)	FAA requires a determination of no hazard to air navigation for structures that will be more than 200 feet above ground level.
Pipeline Safety, Regulatory Certainty, and Job Creation Act (2011)	Designed to examine and improve the pipeline safety regulation (which expired in 2010). Provides for enhanced safety, reliability and environmental protection in the transportation of energy products by pipeline. Regulations promulgated under the Act will be administered by the Pipeline and Hazardous Materials Safety Administration (PHMSA) in the U.S. Department of Transportation.
State	
California Vehicle Code (VC) Sections 353; 2500-2505; 31303-31309; 32000-32053; 32100-32109; 31600-31620; California Health and Safety Code Section 25160 et seq.	Regulates the highway transport of hazardous materials.
VC Sections 13369; 15275 and 15278	Addresses the licensing of drivers and the classification of licenses required for the operation of particular types of vehicles and also requires certificates permitting operation of vehicles transporting hazardous materials.
VC Sections 35100 et seq.; 35250 et	Specifies limits for vehicle width, height, and length.

Table 23: Applicable Laws and Regulations for Transportation and Traffic	
Regulation	**Description**
seq.; 35400 et seq.	
VC Section 35780	Requires permits for any load exceeding Caltrans weight, length, or width standards on public roadways.
California Streets and Highways Code Section 117, 660-672	Requires permits for any load exceeding Caltrans weight, length, or width standards on County roads.
California Streets and Highways Code Sections 117, 660-670, 1450, 1460 et seq., and 1480 et seq.	Regulate permits from Caltrans for any roadway encroachment from facilities that require construction, maintenance, or repairs on or across State highways and County roads.

18.0 UTILITIES AND SERVICE SYSTEMS

Existing Conditions

Water Supply and Distribution

The principal water supply facilities in California are operated by the United Stated Bureau of Reclamation (USBR) and DWR. In California, the Mid-Pacific Region of the USBR is responsible for the management of the Central Valley Project (CVP). The CVP serves farms, homes, and industry in California's Central Valley as well as the major urban centers in the San Francisco Bay Area. The CVP consists of 20 dams and reservoirs, 11 power plants, and 500 miles of major canals and reaches from the Cascade Mountains near Redding in the north to the Tehachapi Mountains near Bakersfield in the south. In addition to delivering water for municipal and industrial uses and the environment, the CVP produces electric power and provides flood protection, navigation, recreation, and water quality benefits (USBR 2011).

DWR is a State agency that is responsible for managing and implementing the State Water Project (SWP). The SWP is a water storage and delivery system of reservoirs, aqueducts, power plants and pumping plants. Its main purpose is to store water and distribute it to 29 urban and agricultural water suppliers in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California (DWR 2010).

Local water districts, irrigation districts, special districts, and jurisdictions (e.g., cities and counties) manage and regulate the availability of water supplies and the treatment and delivery of water to individual projects. Depending on their location and the source of their supplies, these agencies may use groundwater, surface water through specific water entitlements, or surface water delivered through the CVP or SWP. In some remote areas not served by a water supply agency, individual developments may need to rely upon the underlying groundwater basin for their water supply. In these cases, the

project would be required to secure a permit from the local or State land use authority and seek approval for development of the groundwater well(s).

Wastewater Collection and Treatment

The SWRCB is the State agency responsible for the regulation of wastewater discharges to surface waters and groundwater via land discharge. The SWRCB and nine regional water quality control boards (RWQCB) are responsible for development and enforcement of water quality objectives and implementation plans that protect the beneficial uses of the federal and State waters. The State water board also administers water rights in California. The RWQCB's are responsible for issuing permits or other discharge requirements to individual wastewater dischargers and for ensuring that they are meeting the requirements of the permit through monitoring and other controls.

Wastewater collection, treatment, and discharge service for developed and metropolitan areas is typically provided by local wastewater service districts or agencies that may or may not be operated by the local jurisdiction (e.g., city or county). These agencies are required to secure treatment and discharge permits for the operation of a wastewater facility from the RWQCB. Wastewater is typically collected from a specific development and conveyed through a series of large pipelines to the treatment facility where it is treated to permitted levels and discharged to surface waters or the land.

In areas that are remote or that are not served by an individual wastewater service provider, developments would be required to install an individual septic tank or other on-site wastewater treatment system. These facilities would need to be approved by the local or State land use authority and the RWQCB.

Electricity and Natural Gas

The CPUC regulates investor-owned electric and natural gas companies located within California. The CPUC's Energy Division develops and administers energy policy and programs and monitors compliance with the adopted regulations. Energy is provided to California through numerous companies, including: Pacific Gas and Electric Company, Southern California Edison, San Diego Gas and Electric Company, Sacramento Municipal Utility District, and Los Angeles Department of Water and Power.

Solid Waste Collection and Disposal

Statewide, the California Department of Resources Recycling and Recovery (CAL Recycle) is responsible for the regulation of the disposal and recycling of all solid waste generated in California. Cal Recycle acts as an enforcement agency in the approval and regulation of solid waste disposal and recycling facilities. Local agencies can create local enforcement agencies and, once approved by Cal Recycle, they can serve as the enforcement agency for landfills and recycling facilities with their jurisdictions.

Local agencies or private companies own and operate landfill facilities and solid waste is typically hauled to these facilities by private or public haulers. Individual projects

would need to coordinate with the local service provider and landfill to determine if adequate capacity exists to serve the project.

Regulatory Setting

Table 24 describes the applicable laws and regulations for utilities and service systems associated with the Proposed Regulation.

Table 24: Applicable Laws and Regulations for Utilities

Regulation	Description
Federal	None applicable
State	
Waste Heat and Carbon Emissions Reduction Act of 2007	The Waste Heat and Carbon Emissions Reduction Act of 2007 (AB 1613), placed requirements on the CPUC, the CEC, and local electric utilities to develop incentive programs and technical efficiency guidelines to encourage the installation of small CHP systems. The CEC approved efficiency and certification guidelines for eligible systems under AB 1613 in January 2010, and the CPUC approved standardized contracting and pricing provisions between CHP operators and the Investor Owned Utilities in November 2012.
CPUC, Section 95-08-038	This section contains the rules for planning and construction of new transmission facilities, distribution facilities, and substations. The CPUC requires permits for the construction of certain power line facilities or substations if the voltages would exceed certain thresholds.
Section 21151.9 of the PRC/ Section 10910 et seq. of the Water Code	Required the preparation of a water supply assessment (WSA) for large developments. These assessments are prepared by public water agencies responsible for providing service and address whether there are adequate existing and projected future water supplies to serve the proposed project. All projects that meet the qualifications for preparing a WSA must identify the water supplies and quantities that would serve the project as well as project the total water demand for the service area (including the project's water demands) by source in 5-year increments over a 20-year period. This information must include data for a normal, single-dry, and multiple-dry years. The WSA is required to be approved by the water service agency before the project can be implemented.

References

1. Arnold, Jeanne E., and Anthony P. Graesch. 2004. The Later Evolution of the Island Chumash. In Foundations of Chumash Complexity, edited by Jeanne E. Arnold, pp. 1, 3-4. Costen Institute of Archaeology, University of California, Los Angeles, CA.
(CD: Settings/01 Arnold & Graesch 2004)

2. Bean, Lowell J., 1978. Social organization. In California, edited by Robert F. Heizer. Handbook of North American Indians, Vol. 8, pp. 673–674, William G. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
(CD: Settings/02 Bean 1978)

3. Bean, Lowell J., and Charles R. Smith. 1978. Gabrielino. In California, edited by Robert F. Heizer. Handbook of North American Indians, Vol. 8, pp. 538, William G. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
(CD: Settings/03 Bean & Smith 1978)

4. Bean, Lowell J., and Sylvia Brakke Vane. 1978. Cults and their Transformations. In California, edited by Robert F. Heizer. Handbook of North American Indians, Vol. 8, pp. 662-669, William G. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
(CD: Settings/04 Bean & Vane 1978)

5. Beck, Warren A., and Ynez D. Haase. 1974. Historical Atlas of California, p. 24. University of Oklahoma Press, Norman, Oklahoma.
(CD: Settings/05 Beck & Hasse 1974)

6. Bryant, W.A. and Hart, E.W. 2007. Fault rupture hazard zones in California, Alquist-Priolo earthquake fault zoning act with index into earthquake fault zone maps, Special Publication 42, California Geological Survey. Available: ftp://ftp.consrv.ca.gov/pub/dmg/pubs/sp/SP42.pdf. Accessed: November 2011.
(CD: Settings/06 Bryant & Hart 2007)

7. BAAQMD. 2012. California Environmental Quality Act Air Quality Guidelines. Updated May 2012. http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/baaqmd-ceqa-guidelines_final_may-2012.pdf?la=en
(CD: Settings/07 BAAQMD 2012)

8. BAAQMD. 2014. Updated CEQA Guidelines Webpage. Updated January 16, 2014. http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines
(CD: Settings/08 BAAQMD 2014)

9. BCAQMD. 2014. CEQA Air Quality Handbook. Adopted October 23, 2014. http://bcaqmd.shasta.com/wp-content/uploads/CEQA-Handbook-Appendices-2014.pdf
(CD: Settings/09 BCAQMD 2014)

10. California Air Resources Board. 2009. California Almanac of Emissions and Air Quality. Available: http://www.arb.ca.gov/aqd/almanac/almanac09/almanac09.htm.
(CD: Settings/10 ARB 2009)

11. California Air Resources Board. 2013a. Almanac Emission Projection Data. 2012 Estimated Annual Average Emissions. Available: http://www.arb.ca.gov/app/emsinv/2013/emseic1_query.php?F_DIV=-4&F_YR=2012&F_SEASON=A&SP=2013&F_AREA=CA. Accessed: May 4, 2015.
(CD: Settings/11 ARB 2013a)

12. California Air Resources Board. 2013b. 2013 Area Designations for State Ambient Air Quality Standards. Accessed May 3, 2016. http://www.arb.ca.gov/desig/adm/adm.htm
(CD: Settings/12 ARB 2013b)

13. California Air Resources Board. 2014. 2014 Edition California Greenhouse Gas Emission Inventory: 2000-2012. Available: http://www.arb.ca.gov/cc/inventory/pubs/reports/ghg_inventory_00-12_report.pdf. Accessed: May 4, 2015.
(CD: Settings/13 ARB 2014)

14. California Department of Conservation. 2014. California Farmland Conversion Report 2008-2010. Available: http://www.conservation.ca.gov/dlrp/fmmp/Documents/fmmp/pubs/2008-2010/fcr/FCR%200810%20complete.pdf. Accessed May 4, 2015.
(CD: Settings/14 DOC 2014)

15. California Department of Conservation. Important Farmland in California, 2013. Available: ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/statewide/2010/fmmp2010_08_11.pdf. Accessed: May 4, 2015.
(CD: Settings/15 DOC 2013)

16. California Department of Fish and Wildlife. 2015. State Wildlife Action Plan. 2015 Update. Volume 1: Plan Update. Available: https://www.wildlife.ca.gov/SWAP. Accessed: February 2016.
(CD: Settings/16 CDFW 2015)

17. California Department of Fish and Wildlife. 2014 (August). Summary of Natural Community Conservation Plans. https://www.dfg.ca.gov/habcon/nccp/. Accessed October 2014.
(CD: Settings/17 CDFW 2014)

18. California Department of Forestry and Fire Protection. 2012. Resource Management. Available: http://calfire.ca.gov/index.php. Accessed: May 4, 2015.
(CD: Settings/18 Calfire 2012)

19. California Department of Transportation. 2008. A Historical Context and Archaeological Research Design for Mining Properties in California. Division of Environmental Analysis, Department of Transportation, Sacramento, CA.
(CD: Settings/19 Caltrans 2008)

20. California Department of Transportation. 2004. Transportation- and Construction-Induced Vibration Guidance Manual.
(CD: Settings/20 Caltrans 2004)

21. California Department of Transportation. 2009. Technical Noise Supplement.
(CD: Settings/21 Caltrans 2009)

22. California Department of Water Resources. 2003. California's Groundwater: Bulletin 118 Update 2003 Report, accessed 11/17/2011 at http://www.water.ca.gov/groundwater/bulletin118/bulletin118update2003.cfm.
(CD: Settings/22 DWR 2003

23. CAPCOA. 2009. Health Risk Assessments for Proposed Land Use Projects. Approved July 2009. http://www.capcoa.org/wp-

content/uploads/2012/03/CAPCOA_HRA_LU_Guidelines_8-6-09.pdf
(CD: Settings/23 CAPCOA 2009)

24. DWR. 2008 (October). *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water*. Available at http://www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf. Accessed February 2016.
(CD: Settings/24 DWR 2008)

25. California Department of Water Resources. 2010. California State Water Project Overview. Available: www.water.ca.gov/swp. Accessed May 2014.
(CD: Settings/25 DWR 2010)

26. California Energy Commission. 2014a. California's Major Electricity Generation Sources. Available at http://energyalmanac.ca.gov/electricity/electricity_gen_1983-2013.xls. Accessed December 12, 2014.
(CD: Settings/26 CEC 2014a)

27. California Energy Commission. 2014b. California Energy Demand 2014-2024 Final Forecast, Volume 1: Statewide Electricity Demand, End-User Natural Gas Demand, and Energy Efficiency. Available: http://www.energy.ca.gov/2013publications/CEC-200-2013-004/CEC-200-2013-004-V1-CMF.pdf
(CD: Settings/27 CEC 2014b)

28. California State Parks. 2008. California Outdoor Recreation Plan. Available: <http://parks.ca.gov/pages/795/files/2009-2014%20corp.pdf>
(CD: Settings/28 State Parks 2008)

29. Castillo, Edward D. 1978. The Impact of Euro-American Exploration and Settlement. In California, edited by Robert F. Heizer, pp. 99–109. Handbook of North American Indians, Vol. 8, William G. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
(CD: Settings/29 Castillo 1978)

30. Clinkenbeard and Smith. 2013. California Non-Fuel Minerals 2011. Available: http://www.conservation.ca.gov/cgs/minerals/min_prod/Documents/non_fuel_2011.pdf. Accessed November 2011.
(CD: Settings/30 Clinkenbeard 2013)

31. California Natural Resources Agency. 2009. California Climate Adaptation Strategy – A Report to the Governor of California. Available: http://resources.ca.gov/docs/climate/Statewide_Adaptation_Strategy.pdf. Accessed: November 13, 2015.
(CD: Settings/31 CNRA 2009)

32. California Natural Resources Agency. 2012. *Our Changing Climate: Vulnerability & Adaptation to the Increasing Risks of Climate Change in California*. Available at http://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf. Accessed June 8, 2015.
(CD: Settings/32 CNRA 2012)

33. Cook, Sherburne A. 1976. The Population of California Indians: 1769-1970, pp. 4, 38, 43. University of California Press, Berkeley, CA.
(CD: Settings/33 Cook 1976)

34. Cook, Sherburne A. 1978. Historical Demography. In California, edited by Robert F. Heizer. Handbook of North American Indians, Vol. 8, pp. 91–93, William G. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
(CD: Settings/34 Cook 1978)

35. d'Azevedo, Warren (editor). 1986. Handbook of North American Indians, Vol. 11: Great Basin, pp. ix. Smithsonian Institution, Washington, D.C.
(CD: Settings/35 d'Azevedo 1986)

36. Egan, M. David. 2007. Architectural Acoustics. p. 21, J. Ross Publishing. Fort Lauderdale, FL.
(CD: Settings/36 Egan 2007)

37. Erlandson, Jon M., Torben C. Rick, Terry L. Jones, and Judith F. Porcasi. 2007. One if by Land, Two if by Sea: Who Were the First Californians? In California Prehistory: Colonization, Culture, and Complexity, edited by Terry L. Jones and Kathryn A. Klar, pp. 53–62. AltaMira Press, Lanham, Maryland.
(CD: Settings/37 Erlandson et al 2007)

38. Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. Available:
<http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>
(CD: Settings/38 FTA 2006)

39. FRAQMD. 2010. Indirect Source Review Guidelines. Chapter 3. Thresholds of Significance. June 2010. http://www.fraqmd.org/CEQA%20Planning.html
(CD: Settings/39 FRAQMD 2010)

40. Gilreath, Amy J. 2007. Rock Art in the Golden State: Pictographs and Petroglyphs, Portable and Panoramic. In California Prehistory: Colonization, Culture, and Complexity, edited by Terry L. Jones and Kathryn A. Klar, pp. 273, 278. AltaMira Press, Lanham, Maryland
(CD: Settings/40 Gilreath 2007).

41. Harden, D. 1997. California Geology, p. 442. Prentice Hall Inc.: New Jersey.
(CD: Settings/41 Harden 1997)

42. Heizer, Robert F. 1978. Trade and Trails. In California, edited by Robert F. Heizer. Handbook of North American Indians, Vol. 8, pp. ix, 690–693, William G. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
(CD: Settings/42 Heizer 1978)

43. Hoover, Mildred B., Hero E. Rensch, Ethel G. Rensch, and William N. Abeloe. 2002. Historic Spots in California. 5th ed. Revised by Douglas E. Kyle, pp. xiii, xiv, 105-106, 302. Stanford University Press, Palo Alto, CA.
(CD: Settings/43 Hoover et al 2002)

44. Hughes, Richard E., and Randall Milliken. 2007. Prehistoric Material Conveyance. In California Prehistory: Colonization, Culture, and Complexity, edited by Terry L. Jones and Kathryn A. Klar, pp. 259–271. AltaMira Press, Lanham, Maryland.
(CD: Settings/44 Hughes and Milliken 2007)

45. Intergovernmental Panel on Climate Change (IPCC). 2014. Forster, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn, G. Raga, M. Schulz and R. Van Dorland, 2007: Changes in Atmospheric Constituents and in Radiative Forcing. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Table 2.14, pp. 212-213. Available: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html. Accessed: November 13, 2015.
(CD: Settings/45 IPCC 2014)

46. IPCC. 2013. Carbon and Other Biogeochemical Cycles. Available: https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter06_FINAL.pdf. Accessed: November 13, 2015.
(CD: Settings/46 IPCC 2013)

47. Jefferson, George T. 2004. Colorado Desert District Paleontologic Resources and Collections Management Policy, pp. 1, 10. State of California Department of

Parks and Recreation.
(CD: Settings/47 Jefferson 2004)

48. Jones, Terry L., and Kathryn A. Klar (editors). 2007. California Prehistory: Colonization, Culture, and Complexity, pp. 299-301, 303, 305-307, 313. AltaMira Press, Lanham, Maryland
(CD: Settings/48 Jones & Klar 2007)

49. Kroeber, Alfred L. 1922. Elements of Culture in Native California, pp. 278. University of California Publications in American Archaeology and Ethnology 13(8): 278.
(CD: Settings/49 Kroeber 1922)

50. Kroeber, Alfred L. 1925. Handbook of the Indians of California. Bulletin 78, Bureau of American Ethnology, Smithsonian Institution, pp. back cover, front cover. Government Printing Office, Washington, D.C. Reprinted 1976 by Dover Publications, Inc., New York.
(CD: Settings/50 Kroeber 1925)

51. MBAPCD. 2008. CEQA Air Quality Guidelines. Revised February 2008. http://mbuapcd.org/pdf/CEQA_full%20(1).pdf
(CD: Settings/51 MBAPCD 2008)

52. Moratto, Michael J. 1984. California Archaeology, pp. 226-227. Academic Press, New York.
(CD: Settings/52 Moratto 1984)

53. Mount, J.F. 1995. California Rivers and Streams: The Conflict between Fluvial Process and Land Use, pp. 146-147. University of California Press: Berkeley, CA
(CD: Settings/53 Mount 1995)

54. NCUAQMD. 2015. Rule 110-New Source Review (NSR) and Prevention of Significant Deterioration. Amended July 9, 2015. http://www.ncuaqmd.org/files/rules/reg%201/Rule%20110.pdf
(CD: Settings/54 NCUAQMD 2015)

55. NCUAQMD. 2016. Environmental Review Guidelines. Accessed May 5, 2016. http://www.ncuaqmd.org/index.php?page=aqplanning.ceqa#T3
(CD: Settings/55 NCUAQMD 2016)

56. Office of Planning and Research (OPR). 2005. Tribal Consultation Guidelines: Supplement to General Plan Guidelines. Electronic document, http://opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf, accessed

November 7, 2011.
(CD: Settings/56 OPR 2005)

57. Ortiz, Alfonso. 1983. Southwest: Key to Tribal Tributaries, edited by Robert F. Heizer. Handbook of North American Indians, Vol. 10, pp. viii-ix, William G. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
(CD: Settings/57 Ortiz 1983)

58. Paleontology Portal. 2003. California, US. Electronic document, http://www.paleoportal.org/index.php?globalnav=time_space&sectionnav=state&state_id=10, accessed November 12, 2011.
(CD: Settings/58 Paleontology Portal 2003)

59. Ritchie, D. and Gates, A.G. 2001. Encyclopedia of Earthquakes and Volcanoes, pp. 248-251. Checkmark Books, New York.
(CD: Settings/59 Ritchie & Gates 2001)

60. Rolle, W. F. 1969. California a History. Second Edition, pp. 74, 218-220, 252-253, 258-259. Thomas Y. Crowell Company, USA.
(CD: Settings/60 Rolle 1969)

61. Rondeau, Michael F., Jim Cassidy, and Terry L. Jones. 2007. Colonization Technologies: Fluted Projectile Points and the San Clemente Island Woodworking/Microblade Complex. In California Prehistory: Colonization, Culture, and Complexity, edited by Terry L. Jones and Kathryn A. Klar, pp. 63-70. AltaMira Press, Lanham, Maryland.
(CD: Settings/61 Rondeau et al 2007)

62. San Diego Natural History Museum. 2010. Fossil Mysteries: Fossil Field Guide. Electronic document, http://www.sdnhm.org/exhibits/mystery/fg_ankylosaur.html, accessed November 12, 2011.
(CD: Settings/62 San Diego NHM 2010)

63. Santa Barbara County Planning and Development. 2008. Environmental Thresholds and Guidance Manual. Revised July 2015. http://www.sbcountyplanning.org/permitting/ldpp/auth_reg/environmental_review.cfm
(CD: Settings/63 Santa Barbara 2008)

64. SCAQMD. 2015. SCAQMD Air Quality Significance Thresholds. Revision March 2015. http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2
(CD: Settings/64 SCAQMD 2015)

65. Schuyler, Robert L. 1978. Indo-Euro-American Interaction: Archeological Evidence from Non-Indian Sites, edited by Robert F. Heizer, pp. 69, 75. Handbook of North American Indians, Vol. 8, William G. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
(CD: Settings/65 Schuyler 1978)

66. Shasta County. 2004. Shasta County General Plan. Chapter 6.5 Air Quality. As Amended through September 2004. http://www.co.shasta.ca.us/docs/Resource_Management/docs/65airq.pdf?sfvrsn=0
(CD: Settings/66 Shasta County 2004)

67. Shipley, William F. 1978. Native Languages of California. In California, edited by Robert F. Heizer. Handbook of North American Indians, Vol. 8, William G. Sturtevant, general editor, pp. 80-81. Smithsonian Institution, Washington, D.C.
(CD: Settings/67 Shipley 1978)

68. SMAQMD. 2016. CEQA Guide, Chapter 2. Environmental Review and Thresholds. Updated March 2016. http://www.airquality.org/ceqa/cequguideupdate/Ch2EnvReviewThresholdsFINAL.pdf
(CD: Settings/68 SMAQMD 2016)

69. SMAQMD. 2015. SMAQMD Thresholds of Significance Table. Revised May 2015. http://www.airquality.org/ceqa/CH2ThresholdsTables5-2015.pdf
(CD: Settings/69 SMAQMD 2015)

70. SJVAPCD. 2016. Air Quality Thresholds of Significance- Criteria Pollutants. Accessed May 3, 2016. http://www.valleyair.org/transportation/ceqa_idx.htm
(CD: Settings/70 SJVAPCD 2016)

71. Staniford, Edward F. 1975. The Pattern of California History, pp. 98-103. Canfield Press, San Francisco, CA.
(CD: Settings/71 Staniford 1975)

72. TCAPCD. 2015. Air Quality Planning and Permitting Handbook. Guidelines for Assessing Air Quality Impacts. April 2015. http://tehcoapcd.net/PDF/CEQA%20Handbook%20Mar%202015%20Final.pdf
(CD: Settings/72 TCAPCD 2015)

73. University of California at Berkeley. 2009-2010. Languages of California. Available: http://linguistics.berkeley.edu/~survey/languages/california-languages.php. Accessed: November 13, 2015.
(CD: Settings/73 UCB 2009-2010)

74. U.S. Bureau of Reclamation. 2011. Central Valley Project – General Description. Available: <http://www.usbr.gov/projects/Project.jsp?proj_Name=Central+ Valley+Project>. Last updated: Apr 21, 2011. Accessed October 11, 2011. (CD: Settings/74 USBR 2011)

75. U.S. Census Bureau. 2014. State and County Quickfacts. http://quickfacts.census.gov/qfd/states/06000.html. Accessed October 2014. (CD: Settings/75 US Census Bureau 2014)

76. US EIA. 2013a (August 1). Energy in Brief. Available: http://www.eia.gov/energy_in_brief/article/major_energy_sources_and_users.cfm . Accessed: February 2016. (CD: Settings/76 US EIA 2013a)

77. US EIA. 2013b. California. State Profile and Energy Estimates. Available: http://www.eia.gov/state/?sid=CA. Accessed: February 2016. (CD: Settings/77 US EIA 2013b)

78. U.S. Environmental Protection Agency. 2011. Six Common Air Pollutants. Available: http://www.epa.gov/air/urbanair/. Accessed May 4, 2015. (CD: Settings/78 US EPA 2011)

79. U.S. Environmental Protection Agency. 2016. Federal Designations for National Ambient Air Quality Standards. Available: http://www3.epa.gov/region9/air/maps/index.html. Accessed May 4, 2016. (CD: Settings/79 US EPA 2016)

80. U.S. Geological Survey. 1995. Groundwater Atlas of the United States: California, Nevada, HA 730-B, U.S. Geological Survey: Denver Colorado, accessed on 11/17/2011 at http://pubs.usgs.gov/ha/ha730/ch_b/index.html. (CD: Settings/80 USGS 1995)

81. U.S. Geological Survey (USGS) Geologic Names Committee. 2010. Divisions of Geologic Time—Major Chronostratigraphic and Geochronologic Units: U.S. Geological Survey Fact Sheet 2010–3059. Electronic document, http://pubs.usgs.gov/fs/2010/3059/pdf/FS10-3059.pdf, accessed November 11, 2011. (CD: Settings/81 USGS 2010)

82. VCAPCD. 2003. Ventura County Air Quality Assessment Guidelines. October 2003. http://www.vcapcd.org/pubs/Planning/VCAQGuidelines.pdf (CD: Settings/82 VCAPCD 2003)

83. YSAQMD. 2007. Handbook for Assessing and Mitigating Air Quality Impacts. Adopted July 11, 2007. http://www.ysaqmd.org/documents/CEQAHandbook2007.pdf (CD: Settings/83 YSAQMD 2007)

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ATTACHMENT 2:

Summary of Impacts and Mitigation Measures

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Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
Aesthetics		
Impact 1.a: Short-Term Construction-Related Impacts on Aesthetics. Less-than-significant	Not applicable.	Less-than-significant
Impact 1.b: Long-Term Operational Impacts on Aesthetics Less-than-significant	Not applicable.	Less-than-significant
Agriculture Resources		
Impact 2.a: Short-Term Construction-Related and Long-Term Operational Impacts on Agricultural and Forest Resources Less-than-significant	Not applicable.	Less-than-significant
Air Quality		
Impact 3.a: Short-Term Construction-Related Impacts on Air Quality Less-than-significant	Not applicable.	Less-than-significant

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
Impact 3.b: Long-Term Operational Impacts on Air Quality Less-than-significant	Not applicable.	Less-than-significant
Biological Resources		
Impact 4.a: Short-term Construction-Related Impacts on Biological Resources Potentially significant	**Mitigation Measure 4.a** The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of biological resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to biological resources include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review	Potentially significant and unavoidable

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project. • Actions required to mitigate potentially significant biological impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. ■ Retain a qualified biologist to prepare a biological inventory of site resources prior to ground disturbance or construction. If protected species or their habitats are present, comply with applicable federal and State endangered species acts and regulations. Construction and operational planning would require that important fish or wildlife movement corridors or nursery sites are not impeded by project activities. ■ Retain a qualified biologist to prepare a wetland survey of onsite resources. This survey shall be used to establish setbacks and prohibit disturbance of riparian habitats, streams, intermittent and ephemeral drainages, and other wetlands. Wetland delineation is required by Section 3030(d) of the Clean Water Act and is administered by the U.S. Army Corps of Engineers.	

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	■ Prohibit construction activities during the rainy season with requirements for seasonal weatherization and implementation of erosion prevention practices. ■ Prohibit construction activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring, as needed, to address project activities that could cause an active nest to fail. ■ Prepare site design and development plans that avoid or minimize disturbance of habitat and wildlife resources, and prevent stormwater discharge that could contribute to sedimentation and degradation of local waterways. Depending on disturbance size and location, a National Pollution Discharge Elimination System (NPDES) construction permit may be required from the California State Water Resources Control Board. ■ Prepare spill prevention and emergency response plans, and hazardous waste disposal plans as appropriate to protect against the inadvertent release of potentially toxic materials. ■ Plant replacement trees and establish permanent protection suitable habitat at ratios considered acceptable to comply with “no net loss” requirements. Because the authority to determine project-level impacts and require project-level mitigation lies with land use approval and/or permitting agency for individual projects, and that the	

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	programmatic analysis does not allow project specific details of mitigation, there is inherent uncertainty in the dgree of mitigation ultimately implemented to reduce the potentially significant impacts.	
Impact 4.b: Long-term Operational Impacts on Biological Resources Less-than-significant	Not applicable.	Less-than-significant
Cultural Resources		
Impact 5.a: Short-Term Construction-Related Impacts on Cultural Resources and Paleontological Resources Potentially significant	**Mitigation Measure 5.a: Conduct Surveys, Consult with Agencies and Native American Tribes, and Prepare and Implement Formal Recommendations Related to Cultural or Paleontological Resources** The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of cultural resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the	Potentially significant and unavoidable

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to cultural resources include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project. Actions required to mitigate potentially significant cultural impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. ■ Retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61. ■ Seek guidance from the State and federal lead	

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes. ■ Provide notice to Native American Tribes of project details to identify potential Tribal Cultural Resources (TCRs). In the case that a TRC is identified, prepare mitigation measures that: - Avoid and preserve the resources in place, - Treat the resource with culturally appropriate dignity, - Employ permanent conservation easements, and - Protect the resource. ■ Seek guidance from the State Historic Preservation Officer and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American tribes. ■ Regulated entities shall consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies shall provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes. ■ If a resource determined to be significant by the qualified archaeologist (i.e., because the find is	

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	determined to constitute either an historical resource or a unique archaeological resource), the archaeologist shall work with the project applicant to avoid disturbance to the resources, and if completed avoidance is not possible, follow accepted professional standards in recording any find. Preservation in place is the preferred manner of mitigating impacts to archaeological sites. ■ Regulated entities shall define the area of potential effect (APE) for each project, which is the area where project construction and operation may directly or indirectly cause alterations in the character or use of historic properties. The APE shall include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access. ■ Regulated entities shall retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures, Society of Vertebrate Paleontology, 1995 http://www.vertpaleo.org/society/polstateconfomimpact	

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	migig.cfm. ■ Regulated entities projects shall conduct initial scoping assessments to determine whether proposed construction activities, if any, could disturb formations that may contain important paleontological resources. Whenever possible potential impacts to paleontological resources should be avoided by moving the site of construction or removing or reducing the need for surface disturbance. The scoping assessment shall be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements. ■ The regulated entity's qualified paleontological resources specialist shall determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossiliferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses the following steps:	

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	- A preliminary survey (if not conducted earlier) and surface salvage prior to construction; - Physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries; - Monitoring and salvage during excavation; - Specimen preparation; - Identification, cataloging, curation and storage; - A final report of the findings and their significance; and - Choose sites that avoid areas of special scientific value. Because the authority to determine project-level impacts and require project-level mitigation lies with land use approval and/or permitting agency for individual projects, and that the programmatic analysis does not allow project specific details of mitigation, there is inherent uncertainty in the dgree of mitigation ultimately implemented to reduce the potentially significant impacts.	
Energy Demand		

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
Impact 6.a: Short-Term Construction-Related Impacts on Energy Demand Less-than-significant	Not applicable.	Less-than-significant
Impact 6.b: Long-Term Operational Impacts on Energy Demand Less-than-significant	Not applicable.	Less-than-significant
Geology, Soils and Minerals		
Impact 7.a: Short-Term Construction-Related Impacts on Geology and Soils Potentially significant	**Mitigation Measure 7.a** The Regulatory Setting in Attachment 2 includes applicable laws and regulations that provide protection of geology and soils. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or	Potentially significant and unavoidable

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	minimize impacts to geology and soils include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project. Actions required to mitigate potentially significant geology and soil impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. • Prior to the issuance of any development permits, proponents of new or modified facilities or infrastructure would prepare a geotechnical investigation/study, which would include an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils including shrink-swell potential (expansion), soil resistivity, slope stability, mineral resources and the presence of hazardous materials.	

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	• Proponents of new or modified facilities or infrastructure would provide a complete site grading plan, and drainage, erosion, and sediment control plan with applications to applicable lead agencies. Proponents would avoid locating facilities on steep slopes, in alluvial fans and other areas prone to landslides or flash floods, or with gullies or washes, as much as possible. • Disturbed areas outside of the permanent construction footprint would be stabilized or restored using techniques such as soil loosening, topsoil replacement, revegetation, and surface protection (i.e. mulching). Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.	
Impact 7.b: Long-Term Operational Impacts on Geology and Soils Less-than-significant	Not applicable.	Less-than-significant
Greenhouse Gas Emissions		
Impact 8.a: Short-Term Construction-Related Impacts on Greenhouse Gases	Not applicable.	Less-than-significant

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
Less-than-significant		
Impact 8.b: Long-Term Operational Impacts on Greenhouse Gases Beneficial impact	Not applicable.	Beneficial impact
Hazards and Hazardous Materials		
Impact 9.a: Short-Term Construction-Related Impacts on Hazards and Hazardous Materials Less-than-significant	Not applicable.	Less-than-significant
Impact 9.b: Long-Term Operational Impacts on Hazards and Hazardous Materials Less-than-significant	Not applicable.	Less-than-significant
Hydrology and Water Quality		
Impact 10.a: Short-Term Construction-Related Impacts on Hydrology and Water Quality Potentially significant	**Mitigation Measure 10.a** The Regulatory Setting in Attachment 1 includes applicable laws and regulations regarding hydrology and water quality ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under	Potentially significant and unavoidable

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or mitigate hydrology and water quality-related impacts include the following: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project. Actions required to mitigate potentially significant hydrology and water quality impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by	

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	the local lead agency. ■ Under the oversight of the local lead agency, prior to issuance of any construction permits, the proponents for the proposed renewable energy project would prepare a stormwater drainage and flood control analysis and management plan. The plans would be prepared by a qualified professional and would summarize existing conditions and the effects of project improvements, and would include all appropriate calculations, a watershed map, changes in downstream flows and flood elevations, proposed on- and off-site improvements, features to protect downstream uses, and property and drainage easements to accommodate downstream flows from the site. Project drainage features would be designed to protect existing downstream flow conditions that would result in new or increased severity of offsite flooding. ■ Establish drainage performance criteria for off-site drainage, in consultation with county engineering staff, such that project-related drainage is consistent with applicable facility designs, discharge rates, erosion protection, and routing to drainage channels, which could be accomplished by, but is not limited to: (a) minimizing directly connected impervious areas; (b) maximizing permeability of the site; and, (c) stormwater quality controls such as infiltration, detention/retention, and/or biofilters; and basins, swales, and pipes in the	

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	system design. ■ The project proponent would design and construct new facilities to provide appropriate flood protection such that operations are not adversely affected by flooding and inundation. These designs would be approved by the local or State land use agency. The project proponent would also consult with the appropriate flood control authority on the design of offsite stream crossings such that the minimum elevations are above the predicted surface-water elevation at the agency's designated design peak flows. Drainage and flood prevention features shall be inspected and maintained on a routine schedule specified in the facility plans, and as specified by the county authority. ■ As part of subsequent project-level planning and environmental review, the project proponent shall coordinate with the local groundwater management authority and prepare a detailed hydrogeological analysis of the potential project-related effects on groundwater resources prior to issuance of any permits. The proponent shall mitigate for identified adverse changes to groundwater by incorporating technically achievable and feasible modifications into the project to avoid offsite groundwater level reductions, use alternative technologies or changes to water supply operations, or otherwise compensate or offset the	

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
	groundwater reductions. Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.	
Impact 10.b: Long-Term Operational Impacts on Hydrology and Water Quality Less-than-significant	Not applicable.	Less-than-significant
Land Use and Planning		
Impact 11: Short-Term Construction-Related and Long-Term Operational Impacts on Land Use and Planning Less-than-significant	Not applicable.	Less-than-significant
Mineral Resources		
Impact 12: Short-Term Construction-Related and Long-Term Operational Impacts on Mineral Resources Less-than-significant	Not applicable.	Less-than-significant

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
Noise		
Impact 13.a: Short-Term Construction-Related Impacts on Noise Less-than-significant	Not applicable.	Less-than-significant
Impact 13.b: Long-Term Operational Impacts on Noise Less-than-significant	Not applicable.	Less-than-significant
Population and Housing		
Impact 14: Short-Term Construction-Related and Long-Term Operational Impacts on Population and Housing Less-than-significant	Not applicable.	Less-than-significant
Public Services		
Impact 15: Short-Term Construction-Related and Long-Term Operational Impacts on Public Services Less-than-significant	Not applicable.	Less-than-significant

Attachment 2 Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact Significance Before Mitigation	**Potential Mitigation**	**Significance After Mitigation**
Recreation		
Impact 16: Short-Term Construction-Related and Long-Term Operational Impacts on Recreation Less-than-significant	Not applicable.	Less-than-significant
Transportation and Traffic		
Impact 17.a: Short-Term Construction-Related Impacts of Transportation and Traffic Less-than-significant	Not applicable.	Less-than-significant
Impact 17.b: Long-Term Operational Impacts on Transportation and Traffic Less-than-significant	Not applicable.	Less-than-significant
Utilities and Service Systems		
Impact 18: Long-Term Operational Impacts on Utilities and Service Systems Less-than-significant	Not applicable.	Less-than-significant

ATTACHMENT 3

Description of Vehicle Emission Calculations Associated with the Leak Detection and Repair Provisions

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Description of Vehicle Emission Calculations Associated with the Leak Detection and Repair Provisions

Overview:

The Leak Detection and Repair (LDAR) requirements of the proposed Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities (Proposed Regulation) would require quarterly inspections, expand local air district programs to include methane as a covered pollutant, and incorporate leak thresholds and repair requirements specific for methane. This would expand the number of facilities and may increase the frequency of inspections covered under existing local air district volatile organic compound (VOC) LDAR programs. In areas of the state without existing LDAR requirements for VOCs, the Proposed Regulation would establish minimum LDAR requirements for methane and require the regulated entities to establish a new LDAR program meeting those requirements. These provisions would result in an increase of vehicle miles, and their related emissions, from the current baseline. This Attachment provides a description of the Air Resources Board (ARB) staff analysis of these emission impacts provided in Chapter 4.B.3 of this Environmental Analysis. The description provided below was completed for each air district where additional components would be subject to LDAR under the Proposed Regulation.

1. Component Counts

Using data from the 2009 Oil and Gas Industry Survey[36] (2009 Survey), staff identified about 1,035,059 components that will be affected by our Proposed Regulation. This includes components for facilities involved in natural gas processing, onshore natural gas production, natural gas transmission compressor stations, and natural gas storage. In addition to these components, reciprocating compressors less than 250 horsepower are also part of the LDAR program for our Proposed Regulation. ARB identified 771 reciprocating compressors less than 250 horsepower that were not co-located with other components that would be subject to LDAR under the Proposed Regulation. Compressors that were co-located with other components also subject to LDAR were not included in this analysis because no additional travel would be required to inspect those compressors. Staff assumed there would be 11 components per reciprocating compressor subject to the LDAR program. The total amount of components included in this analysis is 1,043,540. These total component counts are found in Table 1.

[36] The 2009 Oil and Gas Industry Survey is available at: http://www.arb.ca.gov/cc/oil-gas/industry-survey.htm

Table 1 Estimated Number of Additional Components to be Inspected under the Proposed LDAR Requirements	
Air District	**Number of additional oil and gas components to be inspected**
Bay Area	13,450
Butte	1,293
Colusa	30,219
Feather River	58,249
Glenn County	44,665
Monterey Bay Unified	11
North Coast Unified	127
Santa Barbara County	49,710
South Coast	7,171
San Joaquin	750,342
Sacramento Metropolitan	17,935
Tehama County	9,606
Ventura County	297
Yolo Solano	60,465

2. Mobile Source Emissions Inventory

Staff developed the emission inventory using data from EMFAC2014 Web Database[37] (v1.0.7). The following selections where made:

- Data Type – Emission Rates
- Region – Air District, then selected for each air districts where additional components would need inspected (Table 1)
- Calendar Year – 2015
- Season – Annual
- Vehicle Category – EMFAC2011 categories, LHD1
- Model Year – Aggregated
- Speed – Aggregated
- Fuel – All

These queries provided staff with air district specific, diesel and gasoline running exhaust emission rates for the following pollutants: reactive organic gases (ROG), total organic gases (TOG), carbon monoxide (CO), nitrogen oxides (NOx), carbon dioxide (CO2), respirable particulate matter (PM10) fine particulate matter (PM2.5), and sulfur oxide (SOx). Additionally, emission rates for tire wear and brake wear were available for

[37] EMFAC 2014 Web Database available at: http://www.arb.ca.gov/emfac/

PM10 and PM2.5. Air district specific vehicle counts for diesel and gasoline vehicles were also provided. (CARB 2016)

3. Annual Travel Time by Fuel Type

Staff contacted a number of contractors who perform LDAR work and estimated that 1 hour of travel time would be required for the inspection of 262.5 components. Staff split the travel time between diesel and gasoline vehicles. To make this split, staff weighted the travel time by the count of diesel and gasoline vehicles provided by EMFAC2014 data queries for each district. This was necessary because pollutant emission rates are specific to fuel type. The travel time by fuel type was multiplied by four to reflect annual travel time for quarterly LDAR[38]. Travel time by fuel type for each district was determined using the formula below:

$$TT_{fuel} = (CC_{district} \div 262.5) \times (VC_{fuel} \div VC_{total}) \times 4$$

where:

TT_{fuel} means the travel time by fuel type (hours/year)

$CC_{district}$ means the component count by air district identified in Table 1 (component)

"262.5" means the number of components that can be inspected for one hour of travel time (component inspections/hour)

VC_{fuel} means the air district specific vehicle count from EMFAC2014 for each fuel type, either diesel or gasoline (vehicle count)

VC_{total} means the air district specific total vehicle count from EMFAC2014 (vehicle count)

"4" means the number of inspections per year (inspections/year)

4. Conversion of Travel Time to Miles

Travel time (in hours) by fuel type was then converted to miles. Staff used an assumption that, on average, for each hour of travel time a vehicle could drive 33 miles. This estimate is based on data from the U.S. Department of Transportation's 2001 National Household Travel Survey (USDOT 2003). This survey reports that the average daily miles traveled for an employed person is 35.5 miles and a daily average travel time of 65.1 minutes resulting in an average vehicle speed of 33 miles per hour. Staff believes that this is a conservative estimate. Many of the additional components identified in Table 1 reside in facilities that already are required to comply with LDAR,

[38] The Proposed Regulation requires quarterly LDAR, but allows for reduced LDAR in specified circumstances. For the purposes of this analysis and to remain conservative in the emission impacts, ARB assumed all LDAR would be quarterly.

therefore much of the additional travel time will be spent within oil and gas facilities that may have restricted driving speeds of less than 25 miles per hour for dust control, safety, or other reasons. Travel to or between facilities would be limited. Conversion of travel time to miles for each fuel type was determined using the formula below:

$$Miles_{fuel} = TT_{fuel} \times 33$$

where:
$Miles_{fuel}$ means the miles driven for each fuel type in each air district (miles/year)

TT_{fuel} means the travel time by fuel type (hours/year)

"33" means average miles for each hour of travel time (miles/hour)

5. Emissions Calculations

Staff determined the emissions associated with increased LDAR using the district specific emission rates from EMFAC2014. These emission rates are in units of grams per mile. Staff calculated the following running exhaust emissions: ROG, TOG, CO, NOx, CO_2, PM10, PM2.5, and SOx. Staff calculated the following tire wear and brake wear emissions: PM10 and PM2.5. The emissions from diesel and gasoline where calculated separately and then summed. The emissions where then converted from grams to tons (metric tons for CO_2). Emissions were determined using the formula below:

$$Emissions_x = (Miles_{fuel1} \times ERfuel1_x) + (Miles_{fuel2} \times ERfuel2_x) \times 1.10231e^{-6}$$

where:
$Emissions_x$ means the running exhaust emissions for the specified pollutants ROG, TOG, CO, NOx, CO_2, PM10, PM2.5, and SOx and the tire wear and brake wear emissions for PM10 and PM2.5 (tons/year)

$Miles_{fuel1}$ means the miles driven for diesel (miles/year)

$ERfuel1_x$ means the diesel emission rate for the specified pollutant ROG, TOG, CO, NOx, CO_2, PM10, PM2.5, and SOx and the tire wear and brake wear emissions for PM10 and PM2.5 (grams/mile)

$Miles_{fuel2}$ means the miles driven for gasoline (miles/year)

$ERfuel2_x$ means the gasoline emission factor for the specified pollutant ROG, TOG, CO, NOx, CO_2, PM10, PM2.5, and SOx and the tire wear and brake wear emissions for PM10 and PM2.5 (grams/mile)

"1.10231e-^{6}" means the conversion of grams to tons (gram/ton); for CO_2 a conversion of 1.0 e-^{6} was used (gram/metric ton).

6. Emissions for PM10 and PM2.5

EMFAC2014 provides PM10 and PM2.5 emission rates for brake wear and tire wear in addition to the running exhaust emission rates. To determine total emissions of PM10 and PM2.5, ARB summed the running exhaust, tire wear, and brake wear annual emissions for each pollutant.

References:

1. California Air Resources Board. 2016. EMFAC2014 Output Files.

2. U.S. Department of Transportation, Bureau of Transportation Statistics. 2003. *NHTS 2001 Highlights Report,* BTS03-05 (Washington, DC: 2003). Available: http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/highlights_of_the_2001_national_household_travel_survey/index.html